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A
TREATISE
ON
RUPTURES,

CONTAINING AN
ANATOMICAL DESCRIPTION OF EACH SPECIES,
WITH
AN ACCOUNT
OF ITS
SYMPTOMS, PROGRESS, AND TREATMENT.

BY

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THE FOURTH EDITION,

REVISED, CORRECTED, AND ENLARGED.

LONDON:
PRINTED FOR CALLOW AND WILSON,
PRINCES-STREET, SOHO.

1824.

602362

LONDON:
PRINTED BY CHARLES WOOD,
Poppin's Court, Fleet Street.

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TREATISE ON RUPTURES.

CHAPTER I.

GENERAL DESCRIPTION OF RUPTURES; ENUMERATION OF THE VARIOUS SPECIES; FORMATION AND PRINCIPAL VARIETIES OF THE COMPLAINT; ANATOMY AND CHANGES OF THE HERNIAL SAC.

IF there be any disorder, which, from the frequency of its occurrence, and from the variety of forms, under which it is presented to the care of the surgeon, demands more than others his most minute and attentive investigation, in every part of its history and treatment, such, assuredly, is that which forms the subject of the following pages. Surgeons of great experience in the treatment of ruptures have estimated, that one-eighth*, or one sixteenth of the

* See ARNAUD, in his Preface; his statement is adopted by GIMBERNAT, p. l. Mr. TURNBULL, Surgeon to the London Rupture Society, asserts, on the authority of "the most diligent and general inquiries throughout the kingdom," that the proportion of the ruptured to the whole population is one in fifteen, including persons of all ages and both sexes.—*Manual*, &c. *Intro-*

human race is afflicted with this complaint; which affects, indiscriminately, persons of both sexes, of every age, condition, and mode of life.

It is true, indeed, that a hernia, if properly managed, is not immediately dangerous to the patient; does not affect his health, nor materially diminish his enjoyments: but it is a source of constant danger, since any violent exercise or sudden exertion may bring it from a perfectly innocent state into a condition, which very frequently proves fatal. The ordinarily harmless nature of these swellings increases the patient's risk, by averting suspicion, and leading him to neglect the means of security and prevention.

The numerous situations in which ruptures may occur, the disorders with which they may be con-

duction, p. 10. JUVILLE, a celebrated truss-maker in Paris, found, that the number of subjects with herniæ was about one-thirtieth of the population in Germany and the North of Europe; one-fifteenth in Italy and Spain; and one-twentieth in France and England.—*Traité des Band. Hern.* p. 21, 22.

My readers will probably not be disposed to rely very implicitly on these, or any similar statements. They appear to be manifestly exaggerated. Mr. LOUIS ascertained the number of patients with herniæ in the different hospitals of Paris. We should expect to find a greater proportion here than among mankind at large, since these very disorders compel many to seek relief at such institutions; yet it will be seen, that the proportion is not so high as the quotations above make it. Of 7027 persons in the Salpêtrière, 220 were ruptured; at the Bicêtre, 212 out of 3800; at the Invalides, 142 out of 2500, or 2600; and of the children at the Hôpital de la Pitié, 21 in 1037.—*Memoires de l'Acad. de Chir. t. v, Supplement*, p. 885.

founded, the very different states in which their contents exist, and the minute anatomical knowledge necessary for operating on them, bestow a peculiar importance on the subject, and require to be studied with the most anxious interest by every man, who wishes to practise his profession with honour to himself, and advantage to his patient. The treatment of ruptures demands, from all these circumstances, as great a combination of anatomical skill, with experience and judgment, as that of any disorders in Surgery.

SECTION I.

General Description of Ruptures.

SURGEONS have established three general divisions of herniæ, according to the three principal circumscribed cavities of the body; *viz.* those of the head, chest, and abdomen. The latter only are the subject of this work; and they are by far the most numerous class. The mobility and varying bulk of the viscera, the pressure which they experience in all considerable efforts and motions of the body, from the muscles which in great part surround and enclose them, and the natural openings of the cavity, are circumstances greatly facilitating the origin of these complaints.

The passage of any part, or parts, naturally contained in the abdomen, out of that cavity, con-

stitutes a *hernia**, or *rupture*, according to the most common acceptation of these terms†. Except in some cases of very rare occurrence, the parts carry before them a portion of peritoneum, which surrounds and encloses them in their new situation, and is called the *hernial sac*; they pass through some natural opening of the abdominal parietes, as the inguinal or crural canal, or the navel; or they are forced between the muscular or tendinous fibres, in some part where there is ordinarily no perforation; or they escape at some point, which has been weakened by a wound, or by disease; and, in the great majority of instances, they form in the part, into which they are protruded, a tumour

* The origin of this word has been variously explained: some derive it from *ερως*, a branch; others, from *hæreo*, or the old adjective *hernius*, hard or rugged. The Greek *κηλη*, a swelling, from which the termination, *cele*, in the nomenclature of ruptures, is derived, has been drawn from *κηλεω*, *noceo*, or *χαλαω*, *laxo*.

† The term is employed frequently in a more vague sense. Various affections of the testis, its coverings and vessels, have been denominated *false*, in contra-distinction to those above defined, or *true herniæ*. They do not fall within the scope of the present work. Again, *herniæ* have been distinguished as *internal* or *external*: the latter consisting of obvious tumours formed in the mode indicated by the definition; while the former are instances of strangulation, caused by certain internal changes of position, not indicated by external swellings, as when the bowels pass through an aperture in the diaphragm, or are confined by preternatural bands of adhesion. A compliance with common usage, which regards these as species of *hernia*, leads me to notice them in this work, although they do not come under the definition.

visible externally. Thus, the parts composing a rupture are contained in a cavity, continuous with that of the abdomen, and lined by a prolongation of its serous membrane.

At its immediate exit from the abdomen, the size of the cavity is limited by that of the opening, which is in most cases tendinous, and therefore unyielding. Its growth is opposed externally, only by the cellular membrane and integuments; it consequently expands so as to form a bag, of various size and figure, communicating with the abdomen by a comparatively small opening, called the *mouth of the sac*. The contracted part, between the mouth and the point at which the membrane begins to expand, is the *neck*; the most distant point from the abdomen, which is generally at the same time the largest, is the *fundus*; and the portion between the latter and the neck constitutes the *body* of the sac.

The contents of a rupture are some part or parts ordinarily contained in the abdomen; and commonly the omentum, or intestines. These are the most moveable viscera, and occupy the front and lower part of the belly; their relative position explains why, in a mixed case, the latter are covered by the former. The small intestine, from the greater looseness of its connection, is more frequently protruded than the large; and the ileum more frequently than the jejunum, in consequence of its greater proximity to the ring and crural arch. A part only of the diameter of the tube is sometimes included in a hernia; any larger quantity may descend, from a

single fold to the whole moveable portion of the canal. Adipous matter is generally deposited in large quantity in the omentum of fat and elderly persons; and in this state it escapes very readily from the cavity. Protrusions of the large intestine consist, generally, either of the cœcum, or the arch or sigmoid flexure of the colon; as these are the least fixed portions of the canal. When the former part descends, it is ordinarily, as we should expect, on the right side; when the latter, on the left. Yet the cœcum, with its appendix, has been seen in ruptures of the left*, the sigmoid flexure in those of the right side†: and both these portions of the gut have been protruded at the navel‡. When we consider that the intestines may descend to the knees, dragging even the stomach to the pubes, and that the bladder, which appears so firmly fixed in the bottom of the pelvis, may, without any separation of its connections, pass through the ring, and descend into the scrotum, we shall be convinced, that the natural position of an organ cannot, of itself, enable us to determine at which opening it may be protruded.

* SANDIFORT, *tabulæ anatomicae situm viscerum, &c. depingentes*. Expl. of tab. 5 and 6. CAMPER found the cœcum in an inguinal hernia of the left side, where there was also a hernia on the right side. — *Demonstr. Anat. Pathol.* part ii, p. 17. MAUCHART witnessed a similar fact, *De hernia incarcerata*, in HALLERI, *Disp. Chir.* t. 3.

† LASSUS, *Med. Operat.* t. i, p. 173. PELLETAN *Clinique Chirurgicale*, t. iii, p. 345.

‡ SANDIFORT, *Obs. Pathol.* cap. iv. PALLETTA, *Nova Gubernaculi testis Descriptio*.

Other abdominal viscera, besides the intestines and omentum, may be protruded. The urinary bladder sometimes passes through the abdominal ring. The ovaries* and uterus†, the

* Each ovary in an inguinal hernia; POTT's *Works*, v. iii, p. 329. See also CAMPER, *Rem. sur le Cancer*; quoted in the French translation of RICHTER, p. 109, note b. The ovary in an ischiatic hernia; CAMPER, *Demonst. Anat. Pathol.* lib. ii, p. 17.

† Uterus and left ovary in a large inguinal hernia. — CHO-PART & DESAULT, *Tr. des Mal. Chir.* t. ii, p. 3. — The uterus, Fallopian tubes, ovaries, and part of the vagina, were found, together with some omentum, in the large crural hernia of a patient who died in the Salpêtrière, at the age of eighty-two. The rupture began at the age of forty-two, after the birth of the eighth child, and did not exceed a hen's egg for thirty-two years; but at the end of that time increased considerably. She was subject, in consequence of it, to attacks of colic, nausea, &c. Several times, in the latter years of her life, it swelled and burst, discharging a clear serous fluid. The tumour was five inches long and four broad, and hung between the thighs. The protruded parts adhered firmly to the sac. — *Journal de Med. Chirurg. Pharm. &c.* par M. LEROUX, t. xxxv.

This seems to be the case quoted by BOYER, in his *Traité de Mal. Chir.* t. viii, p. 382, from the *Bulletin de la Faculté de Med. de Paris*; t. i, p. 1, as having been examined and described by MR. LALLEMENT. The latter gentleman met also with a protrusion of the uterus at the abdominal ring in a patient of seventy-one. At the age of fifty this woman perceived a tumour in the groin, which increased rapidly until it had attained a length of four or five finger-breadths, being pyriform, and attended at first with great sensibility to the touch, which gradually went off. The whole of the uterus, with the right Fallopian tube and ovary, were contained in a thick hernial sac. — *Mem. de la Soc. Med. d'Emulation*; 3^{ème} année, p. 323. — BOYER, *ibid.*

It has been asserted, that the uterus contained in a hernia may

spleen* and stomach have been very rarely seen in ruptures.

When the rupture is small, and subject to no injurious external influences, or when the parts are only occasionally protruded, descending and returning easily, they undergo no change of structure, and execute their functions perfectly. Often, however, they experience more or less injurious consequences from their unnatural situation; and it will be a principal object of this work to explain the causes, nature, and remedies of such alterations.

Thickening, enlargement, general increase of bulk, and slow inflammation of parts producing adhesions, are the effects of long residence in large ruptures†. Effusions of fluid, and of the new matter, called coagulable lymph, which is organized into adventitious membranes, must be referred to the same cause‡. More active inflammation, even to the highest de-

become impregnated; and two cases are related, in which, under such circumstances, it was necessary to bring the child into the world by an incision of the tumour. The infants lived, but the mothers died; one in twenty, the other in three days. The very circumstantial narratives of these cases leave no doubt respecting the principal facts; but it is still uncertain whether the affection was hernia, properly so called, and tolerably clear, that the uterus was not protruded either at the inguinal or crural ring. See SENNERTI *Opera*, *Lugd.* 1650; t. iii, p. 39; and HILDANI, (GUL. FAB.) *Obs. Chir.* lib. iii.

* RUYSCII *Advers.* Dec. 2.

† See the third section of this chapter, and chap. vii, and xii.

‡ See section iii of this chapter.

gree, and mortification, result from the mechanical pressure which takes place in strangulation*.

So long as the viscera descend and return freely, the rupture is said to be *reducible*. When, after long residence in the tumour, they have either increased so much in bulk, or have contracted such adhesion to each other, or to the hernial sac, as to become incapable of being returned, although they experience no pressure from the ring, it is termed *irreducible*. An incapability of reduction, arising from increased bulk of the protruded viscera, which consequently experience pressure from the opening, through which they have descended, brings the disease into the *strangulated* or *incarcerated* state; and the part, by which that pressure is caused, is usually called the *stricture*.

The existence of a peritoneal covering is not essential to the notion of a hernia. That of the bladder and of the cœcum may be formed without a sac†; and ruptures of the bladder in general, as well as the bubonocœles, which contain either the cœcum or the sigmoid flexure of the colon, differ from others with respect to their sac‡.

The contents of a rupture may be found immediately under the skin, when the hernial sac has been burst by a blow§; but this is an unfrequent occurrence.

* See the chapters on strangulated and mortified herniæ.

† See the chapter on ruptures of the bladder.

‡ See the chapter on the anatomy of inguinal herniæ, sect. vi.

§ COOPER, part 1, p. 3. *Supplement au traité de J. L. PETIT,*

It has been asserted, that other herniæ, under circumstances of rare occurrence, do not possess peritoneal sacs. The ancients believed such cases to be very common, and supposed the protrusion to take place in consequence of an actual laceration of the peritoneum. The English word *rupture*, and the equivalent terms in some other languages, indicate an opinion of this kind, which might naturally arise from a superficial observation of the circumstances frequently attending the origin of the complaint. The older surgeons, conceiving the peritoneum to be incapable of sudden extension to a sufficient degree, distinguished the herniæ of sudden origin from those of more gradual development, in which they admitted the existence of a sac. In reference to this opinion, as to the different mode of formation, they called the former herniæ by rupture, and the latter herniæ by dilatation. Experience

sur les maladies chirurgicales ; p. 113. RUDTORFFER, *abhandlung über die einfachste und sicherste Methode*, &c., b.i, p. 145.

BARON BOYER refers to this head a case, in which he operated, of a man sixty years old, who had had an inguinal rupture from infancy. The patient had long observed, that pressure on the tumour forced it above the ring, so that he was obliged to push the parts from above downwards. The swelling became strangulated, and was found by BOYER extending from the groin towards the navel, and, as he says, manifestly covered only by the skin. A very small portion of the intestine was contained in the hernial sac; the rest had escaped at an accidental aperture, and lay between the skin and the aponeurosis of the obliquus externus. On examination after death, the rupture of the upper part of the sac was ascertained. — *Traité des Mal. Chirurg.* t. viii, p. 72.

has shown this distinction to be unfounded ; and has proved, that ruptures of both description have sacs ; a conclusion, which correct anatomical views would certainly have suggested. When we consider the texture of the peritoneum, and the mode of its connection to the abdominal parietes, we cannot fancy the possibility of tearing the membrane by any attitude or motion. This opinion is strengthened by the impunity with which the harlequin and tumbler practise their tricks, throwing their trunks into every contortion, which the bony fabric will admit ; and leads us to regard with suspicion, if not to condemn as fabulous, the case of rupture related by GAREN-GEOT*. Authors of reputation state the following as cases, in which no sac exists : *viz.* herniæ consequent on penetrating wounds of the abdomen ; those which return after an operation ; or, where the sac has been destroyed by caustic, or other means, with a view to the radical cure. I have seen no such instances. Some add umbilical herniæ ; this point will be considered in the chapter on that subject.

The hernial sac is not in all cases a protrusion of the peritoneum ; the parts contained in a congenital rupture are surrounded by the serous membrane of the testicle.

Although a visible external tumour exists in

* A young woman, after throwing her trunk suddenly backwards, felt immediately a considerable pain in the abdomen. GAREN-GEOT discovered a crural hernia, on which he afterwards operated. It contained omentum, not covered by any sac. *Operations ; t. i, p. 373.*

most instances, it is not an universal symptom. Inguinal, femoral, or umbilical ruptures may be so small, as not to produce any enlargement of the part; the rupture of the diaphragm is altogether internal.

SECTION II.

Enumeration of the various Species of Ruptures.

THE rupture is named either according to its situation in the body, or from the parts which it contains. The groin, scrotum, labia pudendi, bend of the thigh, and navel, are the most frequent seats of these swellings; the omentum and intestines their most common contents.

When the protruded viscera have entered the superior opening of the inguinal canal, and are contained in the canal; or, when they have emerged from it, through the inferior aperture, in either sex, without passing farther than the groin, the case is called a *bubonocoele*, or *inguinal hernia*. As this increases in volume in the female, it descends into the labium pudendi, still retaining the same name. In the male, the increasing tumour extends into the scrotum, and forms an *oscheocoele*, or *scrotal rupture**. If it is formed in the latter sex, before the commu-

* While the parts are still in the groin, the hernia has been called *incomplete*; the epithet, *complete*, has been given when they have descended into the scrotum or labia. The distinction is a bad one, since the rupture, in all its essential characters, is as complete in the former case as in the latter.

nication between the peritoneum and the tunica vaginalis testis has been closed, the case is named a *hernia congenita*; because the disposition of parts, from which this peculiarity arises, exists at the time of birth.

The ruptures which take place at the inferior aperture of the inguinal canal, without passing through the canal, and which, appearing first in the groin, and then descending into the scrotum, do not differ in their situation from the above-mentioned inguinal and scrotal herniæ, have not been generally distinguished by any peculiar name. It will be seen, in the anatomical description, that these pass out of the abdomen, on the inner side of the epigastric artery; while the former are protruded on the outer side of the same vessel: hence they are now distinguished by the epithets *internal* and *external*. The former have been also called *ventro-inguinal*.

The rupture which occurs through the small opening under the pubic extremity of the crural arch, and manifests itself at the bend of the thigh, is called *femoral* or *crural* hernia, or *merocele**.

The *exomphalos*, *omphalocele*, or *umbilical* hernia, takes place through the round opening of the linea alba, which transmits the umbilical blood-vessels of the foetus.

In the cases now enumerated, the viscera pass through natural openings of the parietes; but protrusions may occur at any other part of the abdo-

* From *μηρος* the inside of the thigh, and *κηλη*.

minal region, and they are then called *ventral herniæ*. They are most frequent in the *linea alba*; and, when taking place above the navel, have been called *herniæ of the stomach*.

These are by far the most common species*; but there are some more rare kinds.

In the *hernia of the perineum*, in either sex, the parts are protruded by the side of the bladder or vagina. A tumour may be formed in any part of the female vagina, constituting *vaginal hernia*: *pudendal hernia* is a modification of the affection, in which the parts, instead of protruding any portion of the vagina, pass into the *labium pudendi*. The *ischiatric* rupture, and that of the *foramen ovale*, take place through the respective openings of the pelvis, and the *hernia of the diaphragm* is protruded through some part of that muscle.

* The comparative numbers of the different kinds of ruptures may be seen in the following particulars, extracted from the Report of the City of London Truss Society, 1814.

Of 7599 cases, 6458 were males, 1141 females.

Males.	Females.				
1469	14	Left inguinal	} 4070 inguinal	} 4665 single.	
2567	20	Right inguinal			
38	246	Left femoral	} 595 femoral		
47	264	Right femoral			
2182	10	Double inguinal	}	} 2367 double.	
36	139	Double femoral			
92	387	Umbilical			
10	34	Ventral			
	1	Obturator			
17	26	Operated on.			

The ages of persons relieved with trusses were as follows:—

The mesentery and mesocolon are the seats of *mesenteric* and *mesocolic* herniæ; and the bowels undergo various internal strangulations, not coming properly under the description of herniæ.

The names *enterocele* and *epiplocele*, which are equivalent to *intestinal* and *omental* rupture, are

524	.....	under	10	years.
384	...	between ...	10	& 20
771	.....		20	— 30
1286	.....		30	— 40
1471	.....		40	— 50
1420	.....		50	— 60
988	.....		60	— 70
347	.....		70	— 80
38	.....		80	— 90
2	.....		90	— 100

The cases of congenital hernia were 454.

Two patients had, each, double inguinal and double femoral hernia. Sixteen had three ruptures each; and forty-seven had two of different kinds.

Of 457 herniæ examined by MR. CLOQUET, 307 occurred in the male, 150 in the female sex; 246 on the right, 187 on the left side, and 24 on the middle line of the abdomen.

The numbers of the different kinds were as follows:—

Males. Females.

94	11	Right external inguinal	} 203 external.	} 289
79	19	Left		
39	8	Right internal	} 86 internal.	
35	4	Left		
33	54	Right femoral	}	} 134
22	25	Left		
3	21	Umbilical & linea alba		24.
2	5	Right obturator	}	} 10 ob-
0	3	Left		
				turator.

Recherches sur les Causes et l'Anatomie des Hernies abdominales;

p. 9, note.

employed according as the swelling contains intestine or omentum alone : where both these parts are found in the same tumour, it forms an *entero-epiplocele*.

A protrusion of the urinary bladder constitutes the *cystocele*, or *hernia vesicæ* ; that of the stomach, *gastrocele* ; of the spleen, *splenocele*, &c. A compound word is sometimes employed, expressing both the situation and contents of the rupture ; as *entero-bubonocèle*, *epiplomphalocèle*, &c.

The case of *double ruptures* (*inguinal* or *femoral*) is constituted by the protrusion of the viscera through the corresponding apertures of the right and left side. But there is another kind of double rupture, not ascertainable in general, except by examination after death, or in operating ; *viz.* two sacs passing through the same opening : this may happen in external or internal inguinal ; or crural herniæ. There are instances of even three sacs, particularly in internal inguinal herniæ.

SECTION III.

Formation and principal Varieties of the Hernial Tumour ; Anatomy and Changes of the Hernial Sac.

To the *hernia alba* and to the tendinous sheaths, which enclose the recti abdominis, the peritoneum adheres very closely, and almost inseparably : it is

more loosely connected to the rest of the abdominal parietes, and particularly at the lower part, the back, and sides, by a soft, extensile, and elastic cellular substance, which easily gives way when the membrane is subjected for a long time to the action of a distending force, and thus allows it to undergo a real change of situation, a displacement, without any laceration of the connecting medium. This elongation of the membrane, without rupture of its natural connections, is evidenced in distension of the bladder, uterus, and stomach; in the descent of the testis; and in the passage of the bladder, cæcum, and sigmoid flexure of the colon into the scrotum.

The phænomena of ascites and pregnancy, and the varying magnitude of several abdominal viscera, prove, that the peritoneum is also susceptible of elongation by distension, and that it will regain its original size when the distending force ceases to act.

The combined operation of these two changes, displacement and distension, accounts for the great extension which the membrane frequently suffers in cases of hernia. Scrotal ruptures often descend to various distances on the thigh, sometimes, indeed, even to the knee; yet the whole inner surface of the bag, in which all the loose viscera of the abdomen may be contained, is lined by a continuation of peritoneum.

Perhaps, in cases of sudden forcible distension, in situations where the membrane is thin, and ad-

heres very closely to the abdominal parietes, or other surrounding parts, its texture may partially yield, and undergo a loosening, or species of laceration, such as in the case of silks or other stuffs we call fraying, the French *eraillement*, a kind of cicatrization would follow, and leave lines or marks behind, indicating the nature of the occurrence.

By pressure with the finger, in the dead body, where the cellular connections of the peritoneum are loose, and the tendinous openings large and yielding, the peritoneum is easily forced through, and thus forms an artificial hernial sac. Mechanical distension in the living body, under the circumstances explained in the following chapter, acts in a similar manner in producing a true rupture; the viscera being urged against the peritoneum, and forcing it through the opening in the abdominal parietes.

The same causes, which first produced the complaint, or others of an analogous nature, are constantly tending to promote its increase. The tumour becomes larger, in proportion as the pressure against the hernial sac is stronger and more frequent; hence the great size which they often attain in persons constantly pursuing laborious occupations: in proportion as the resistance, offered by the parts, in which the tumour is seated, is less considerable; thus scrotal ruptures are very large, crural, on the contrary, small: in proportion as the opening through which it passes is larger and weaker; hence inguinal usually much exceed crural ruptures in magnitude: and as the cellular connections of

the peritoneum are looser ; hence ruptures of the linea alba are generally small.

The form of the sac must necessarily be modified by that of the openings through which it is protruded, by that of the parts, into which the tumour passes, and by the resistance which it experiences in different parts of its progress and surface : hence the difference in size and figure between scrotal, femoral, and umbilical ruptures.

When the sac, having passed the parietes of the abdomen, is situated among cellular or adipous substance, it expands equally in all directions, and forms a nearly spherical tumour, being, however, in general rather flattened ; umbilical and crural hernia are of this kind.

If it is protruded into a canal, it is nearly cylindrical, the mouth, body, and fundus being of equal magnitude ; such is the case in incipient inguinal herniæ, and even in those which have passed the ring, and are still confined by the sheath of the spermatic chord. The fundus of the sac enlarges, as it descends into the scrotum, and thus the swelling becomes pyriform in almost all scrotal cases.

Sometimes, but not frequently, the sac is conical, the mouth forming the basis, and the fundus, which is usually obtuse, the apex of the cone. Such sacs have no neck.

The figure of the sac varies at different periods of its progress ; cylindrical or conical at first, it becomes globular or pyriform subsequently.

Irregularities of shape often take place from the membrane extending in particular directions, where the resistance is least.

Hernial tumours produce important changes in the openings at which they are protruded, distending and enlarging the aponeurotic apertures, altering their direction and figure, separating and expanding the tendinous fibres.

The form and size of the mouth of the sac are regulated by those of the tendinous opening; the direction and magnitude of the neck depend on the nature of the passage through which it goes. The unyielding nature of the parts makes both these comparatively small, while the body of the sac, being opposed merely by the cellular and adipous tissue of the parts into which it is protruded, is generally much larger.

As the course of the openings is in some instances more or less indirect, and the subsequent development of the tumour depends on the degree of resistance that it may meet with, the direction or axis of the sac varies in different parts of its course; and a knowledge of these changes is of importance in reference to reduction, and to the application of trusses.

At the first moment of the occurrence of a hernia, when it is formed suddenly, the protruded peritoneum is unconnected to the parts, among which it lies: but adhesions take place so quickly, that the sac is found universally connected to the contiguous

parts, even in a rupture of two or three days standing; and these connections become afterwards so strong and general, that we might suppose the hernial sac to have been originally formed in its unnatural situation. In the subsequent increase of such ruptures, the peritoneum is slowly displaced, without separation of its cellular connections; and in other cases the sac is slowly developed in the same manner, from the first, so as never to be found unadherent.

The sac adheres to the surrounding parts by a cellular texture, of which the fibres are short, but soft and pliant. Sometimes the adhesion is more loose, the adipous and lax tissue which covers the peritoneum in the inguinal and crural regions being copious, and descending with the membrane. In other cases, the adhesion is rendered firm and compact by the consequences of inflammation or irritation, from pressure or other causes: in this way, the hernial sac may become even consolidated with the skin, or other surrounding parts.

The adhesions of the sac prevent it from being returned into the abdomen, when the contents of the swelling are replaced; it remains behind, ready to receive any future protrusion. The difficulty, arising from the same source, in separating the sac from the surrounding parts, and particularly from the spermatic cord, constitutes an insuperable objection to the proposals for returning the entire sac into the abdomen; and must have been a source of great

danger in some of the old methods of attempting the radical cure of ruptures.

The peritoneum, which immediately surrounds the protruded viscera, retains generally the same thin and delicate structure, which characterises the membrane in its natural situation. It has the same polished and secreting surface, from which a serous exhalation proceeds; it envelops and protects the protruded organs, embracing them closely, and being to them what the peritoneum is to the contents of the abdomen.

This peritoneal sac is covered by other investments, varying in thickness and structure, according to the part in which the swelling is formed, and to other circumstances. The thickness of the sac, taken altogether, depends on these adventitious coverings, the peritoneum changing very little: it is generally thicker and stronger, in proportion to the size of the tumour, and the duration of the complaint; thus the sac has been seen of six lines in thickness*. Yet, occasionally, instead of increased thickness, we observe the opposite process of absorption, or thinning, in large ruptures: in some cases the coverings are so reduced, that the convolutions and vermicular motions of the intestines may be distinguished through the skin; hence it may appear that the sac is entirely wanting; but it will be possible to trace the peritoneum in the neighbourhood of the opening.

* ARNAUD, *Mémoires de Chirurgie*; t. i, p. 53.

The mouth of the sac is generally rounded ; sometimes oblong, or triangular, with the angles rounded off; or it may assume the form of a slit. It varies in size, from that of a quill, or even a probe, to a magnitude capable of admitting the fist, and allowing the entrance of all the abdominal viscera.

It is generally directed towards the centre of the abdomen; such, at least, is the case in umbilical, crural, internal inguinal, and large old external inguinal herniæ. Sometimes it is oblique, presenting at the lower part a semilunar fold, of valvular form and arrangement, over which the finger must be carried in a slanting direction to enter the sac. Recently formed external inguinal herniæ present examples.

The state of the neck is an important point in the anatomy of the hernial sac, which has been very minutely investigated by Mr. J. CLOQUET; he has published the result of his inquiries on this and other parts of the subject, in his *Recherches sur les Causes et l'Anatomie des Hernies Abdominales*; 4to, Paris, 1819; illustrated with ten plates, containing numerous lithographic figures from his own drawings.

“The thickness of the neck of the sac,” says Mr. C., “varies much. In small ones, of a conical figure, the peritoneum retains its natural structure at this part, simply turning over, and lining the aponeurotic ring. This is the least frequent case; more commonly, in passing through the narrow aperture, it is folded, puckered, contracted, and gains in thickness what it loses in extent of surface. The whole

circumference of the neck presents fine folds, radiated wrinkles, more or less numerous, and approximated to each other. If we distend these folds, they are seldom completely effaced, as the two membranous plates, which form each of them, become adherent; this puckering, or gathering of the peritoneum, necessarily increases the thickness of the neck of the sac.

“These folds are the rudiments of those, which form when the mouth of the sac gradually contracts; it ultimately disappears, giving origin to radiated marks, disposed like the rays of a star, and indicating the place of its former existence. I have called these marks *stigmata* of the hernial sac, because they closely resemble true cicatrices of the peritoneum and other serous membranes. Sometimes the neck of the sac presents a rounded, whitish, almost fibrous, and very firm ring, either of uniform or varying thickness, in different points of its circumference. In other individuals it is thin, presenting an incomplete septum, with central aperture, formed by the mutual contact of the hernial sac, and the peritoneal lining of the abdomen. The opening is generally furnished with a thick fibrous edge, or it may be thin and cutting*.”

In many herniæ, the orifice of the sac presents a combination of the preceding characters. Thus it may be fibrous, thick, and rounded in one part; thin, and like a valvular fold in another; hard, callous, and folded in one place; uniform and natural in other parts.

These important changes in the membrane forming the mouth of the sac are easily accounted for by the circumstances attendant on its new situation, where it is confined in the aponeurotic opening, pressed between it and the protruded parts, and generally subject to the nearly constant pressure and irritation of a truss. The peritoneum, which, in its natural state is soft, thin, and yielding, becomes thick and hard, and the mouth of the sac is converted into a kind of callous ring. The effect is augmented by the surrounding cellular substance undergoing a similar change. In this way the part acquires a considerable thickness, with a kind of cartilaginous hardness; and thus becomes capable of embracing very firmly the protruded parts*.

The peritoneum is generally applied closely to the tendinous opening, adhering by cellular substance, so that the mouth of the sac, and the aperture at which it protrudes, are of the same size. These parts may, however, be separated, as in protrusions of the bladder, cœcum, and sigmoid flexure; where the mouth of the sac may be small, while the ring is very large. In such cases, the peritoneal covering of the protruded viscus forms

* ARNAUD found the neck of the sac “entièrement cartilagineux, épais de trois lignes.” *Tr. des Hernies*; t. ii, p. 11.

SCARPA has very frequently found the neck of the sac thus changed: sometimes contracted for the length of an inch, at others, simply constricted at one point, or thickened, with the cellular substance and the cremaster hardened, and the whole coriaceous and unyielding. *Tr. sur les Hernies*; m. ii, sect. vii.

part of the mouth of the sac, and is separated from the tendon by the part which it covers. Fat is sometimes collected about the neck of the sac, separating it from the aponeurotic opening.

The connection of the sac to the tendinous aperture varies much; it may be firm, so as not to be separable without laceration; or so loose, that the separation is quite easy.

If the causes, which have produced the hernia, continue to operate, and further descent of the peritoneum be prevented by its strong adhesion to the tendinous opening, the sac becomes thinned by distension: it may give way partially, by a kind of laceration, and thus become irregular in figure, presenting an appearance of small cysts, or secondary cavities. On the contrary, when the neck does not adhere so strongly, and the mouth of the sac forms a thickened ring, the renewed action of pressure may make the ring descend, and a fresh one will form at the new mouth of the sac. This process may be again repeated; and thus the sac presents one or more constrictions, by which the protruded parts may be compressed, and even strangulated. Inguinal and scrotal ruptures are almost the only cases in which this occurrence can take place. When the hernia passes through a canal, a thickened ring may be formed at both orifices of the canal.

If a hernial sac has been formed, and its mouth become thickened, a new protrusion may take place by the side of it; this may occur again; and thus we may have sacs composed of two lateral

cavities, or consisting of two or more secondary openings into one principal protrusion; or the original serous cavity may be contracted, and form a small appendix to the subsequent protrusion. More detailed descriptions and figures of the above-mentioned, and of other varieties in the configuration and structure of the sac, will be found in MR. J. CLOQUET'S *Rech. sur les Causes et l'Anatomie des Hernies Abdominales*.

The hernial sac is subject to the diseases and changes of structure, which are incidental to other serous membranes, and these generally affect, at the same time, the serous coverings of the protruded viscera. Closely embraced by a narrow opening, forming an external tumour, and covered almost simply by the skin, it is liable to direct injury, as by wounds, bruises, friction, pressure, or other violence, and is exposed to the influence of heat and cold; hence it frequently becomes inflamed, and exhibits the usual results of increased action in its various degrees. The most violent inflammation of the sac is observed in strangulated ruptures, and proceeds occasionally to mortification.

Coagulable lymph, thrown out on its serous surface, and on that of the protruded parts, at first agglutinates, by a soft medium, those parts to each other and to the sac, and afterwards, being organized, forms the adventitious medium of adhesions. In their firm texture and polished surface, the latter ultimately resemble the serous membrane, from which they are produced. They form threads or

bands of various length, size, and direction, uniting the viscera to each other, or to the sac; sometimes they produce a general adhesion of the parts. Occasionally, an adventitious membrane is found, lining the sac, or spread over the contents.

Although general agglutination of the sac and its contents is produced by the violent inflammation caused by strangulation, adhesions may be formed by a much less serious disturbance; by a degree of increased action, not marked by any pain or local symptoms. The subject of adhesions is again alluded to in the chapter on irreducible ruptures.

Turbid serous exhalations may accompany the deposition of coagulable lymph in the most acute inflammatory affections of the sac; and a serous fluid, more like that of ascites, may occur under slighter inflammation, or without any characteristic symptoms. Examples, in which such fluid has accumulated in large quantities, are cited in a note to chap xi, sect. i.

The various parts of the sac, as Mr. J. CLOQUET* observes, may undergo fibrous, fibro-cartilaginous, cartilaginous, or osseous change of structure, either from inflammation, or a change in the nutrition of the part, consequent on pressure or other irritation. In the two former cases the membrane is fibrous, thickened, whitish, and firm; and this fibrous structure is frequently seen in the neck of the sac. The cartilaginous alteration is generally partial, in the

* *Rech. sur les Causes et l'Anat. des Hernies Abd.* p. 145, et suiv.

form of irregular plates, varying in number, form, size, and situation. They are sometimes thin and flat; sometimes thicker, and projecting into the sac; they may form numerous small white granulations. They are developed in the cellular tissue, external to the peritoneum, and are covered by a smooth, polished, and closely adherent layer. Ossification sometimes occurs in the hernial sac, either in the form of plates, or of thicker and irregular nuclei.

The internal surface of the sac, or the peritoneal covering of the protruded part, often exhibits black spots, of various tints, size, and position. They sometimes cover nearly the whole surface. Sometimes there are red spots, like ecchymoses; they may be bright, or dark red; and they are, occasionally, brown. Probably all these are degrees of one and the same change. The black spots are found once in about fifteen or twenty herniæ; and they are sometimes met with on the intestines and the abdominal parietes*.

* *Rech. sur les Causes et l'Anatomie des Hernies Abd. p. 151.*

CHAPTER II.

CAUSES OF RUPTURES.

THE causes of these complaints may be referred in general to two divisions, according as they appear to operate by increasing the pressure of the viscera, or by diminishing the resistance of the abdominal parietes. The former may be ranked, in a systematic arrangement of the subject, as *occasional* or *exciting*; the latter as *predisposing* causes of the complaint.

Alternate contractions of the diaphragm and abdominal muscles are the chief agents in producing the mechanical phenomena of respiration, and important auxiliaries in the functions of the principal abdominal viscera. The descent of the diaphragm, in inspiration, enlarges the perpendicular diameter of the chest, by pushing the abdominal contents downwards and forwards; the subsequent contraction of the abdominal muscles in expiration, carrying back the viscera, again diminishes the thorax. A regular succession of such motions constitutes ordinary respiration, in which the surface of the abdomen presents an uninterrupted series of alternate gentle elevations and depressions, the cavity itself being changed merely in form, not in size. In executing these motions, the containing and con-

tained parts act and react on each other. The polished and moistened serous surfaces of the viscera and parietes, enabling them to yield with the greatest facility, render the pressure of the respiratory muscles equable over the whole abdomen, as if it were exerted on a fluid; and this uniform distribution of the force is assisted by the readily yielding gaseous contents of the alimentary canal. The elasticity of the latter produces a reaction on the muscles, when their contraction has ceased. The general pressure thus produced maintains the viscera in their relative position.

The muscular contraction, and the resistance of the compressed parts, are suited to each other in the healthy natural state of the frame; but the proportion is disturbed under various circumstances. A general increase of the contents produces a corresponding extension of the containing parts, as in ascites, tympanites, pregnancy, corpulence; and a similar yielding of all the parietes may occur in a more limited space of the abdomen; but neither of these cases comes properly under the description of a hernia.

The pressure which the viscera constantly receive from the respiratory muscles becomes greatly augmented by any unusual exertion, which is always attended with a forcible action of the expiratory and inspiratory powers at the same time. When such efforts are carried beyond a certain point, the parietes of the cavity give way to the impelling force at those parts where they are weakened by the

holes for the transmission of blood-vessels; and the viscera are thrust forth from their situation, carrying before them a portion of the peritoneum, which forms the hernial sac. Thus it is that ruptures are frequently produced by the act of lifting or carrying a heavy weight, in running, or jumping; in short, under any circumstances where considerable efforts are used. On such occasions the abdominal muscles and diaphragm are called into forcible exertion, for the purpose of fixing the trunk, and affording a steady point of support to the limbs. In the case of straining, a person is said, in common language, to hold his breath; that is, he first puts the diaphragm in action by a deep inspiration, and then contracts his abdominal muscles. The viscera, compressed by these two forces, escape, wherever an opportunity is allowed, provided the pressure exceeds the resistance offered by the ring, or crural arch. On these principles we can account for the observation concerning the greater frequency of ruptures among the inhabitants of mountainous countries*, with whom opportunities must frequently

* The frequency of ruptures in Switzerland has been noticed long ago; see FREYTAG *Diss. de Oscheo-entero-et-Bubonoccele Helvetiæ incolis frequentibus*; Argent. 1721. BLUMENBACH found them particularly numerous in a district of Appenzell, and ascribes their prevalence to the universal practice of the most violent gymnastic exercises by the young lads; to a sport followed by the grown up men, in which a stone weighing eighty pounds or more is poised by the right hand on the shoulder, and thrown forwards by a sudden spring of the whole body; and to the manner in which they carry home from their fields, upon their

occur of exerting their strength and activity; as well as for their being more common in the labouring classes of the community. For the same reason they are more frequent in the male than in the female sex^{*}; and on the right than on the left side of the body†.

The great numerical disproportion between right and left ruptures, does not depend on any disparity in size between the apertures of the two sides, but must be referred to the employment of the right side in those offices of life, which require the most powerful exertion. MR. CLOQUET‡, who has considered this point more minutely, observes, that when we employ the right arm in lifting a weight, dragging, or any other considerable effort, we incline the chest towards the

backs, very heavy loads of hay, &c. — BLUMENBACH, *Medicinishe Bibliothek*, t. i, p. 725; RICHTER, *Chirurg. Biblioth.* t. viii.

* From a Report of the City of London Truss Society, for the year 1814, it appears, that of 7,599 persons, to whom that institution had afforded relief, from the period of its first establishment, 6,458 were males, and 1,141 females. The New Rupture Society had relived 3,505 males and 565 females. *Medical and Physical Journal*, vol. xxxi, p. 168.

† Of the 7,599 cases mentioned in the foregoing note, 2,567 males and 20 females had right, 1,469 males and 14 females, left inguinal hernia: 264 females and 47 males, right femoral; 246 females and 38 males, left femoral hernia. In the New Rupture Society, the numbers of males and females, with right and left inguinal hernia, were, respectively, 1,563 and 51, 927 and 34; with right and left femoral hernia, 19 and 139, 11 and 93.

‡ *Recherches sur les Causes et l'Anatomie des Hernies Abdominales*, p. 10 — 13.

left, so as to curve the trunk, and stretch the right abdominal muscles. The inferior surface of the diaphragm, which in the erect attitude looks downwards and forwards, is now inclined towards the right, so as to push the viscera, when it acts, towards the right iliac region, and thus to increase the distending force in a quarter, where, from the stretched state of the muscles, the power of resistance is already diminished.

The forcible action of the respiratory muscles in expelling the contents of the viscera, as in vomiting, straining at stool, and the act of parturition, may produce ruptures. In strictured patients I have seen herniæ formed gradually, in consequence of the habitual efforts required for the evacuation of the bladder. Crying, and the whooping-cough, are frequent sources of the complaint in children.

All increase of volume in the abdominal contents, as distension of the alimentary canal by food or air, favours the production of ruptures. By causing pressure of the contained against the containing parts, it gives the former a tendency to escape. Thus any of the circumstances already enumerated will act more effectually after a meal, or when the abdomen is distended with wind. Thus, too, the viscera loaded with fat, in elderly and corpulent persons, slip out very easily, and are retained with much difficulty. Hence also the importance of avoiding costiveness in these complaints.

The protrusion of the bowels, at the ring and crural arch, is favoured by the position of these open-

ings, as well as by the comparative weakness of the parietes; though it must be observed, that, in consequence of the obliquity of the inguinal canal, the pressure does not act in the direction of its axis. The diaphragm and abdominal muscles exert a firm compression above, at the sides, and in front, and thus impel the parts downwards and forwards, against the above-mentioned openings. When the upper part of the cavity is subjected to forcible external pressure, as by the application of tight-laced stays, the viscera are driven downwards, and the formation of an inguinal or crural rupture is much facilitated. That the consequences of this practice are not imaginary may be proved by dissection, which shows us an actual change of figure in the lower ribs, and sometimes the obvious marks of external pressure on the surface of the liver.

In the natural play of the respiratory organs, the front of the belly rises and falls in alternation with the descent and ascent of the diaphragm. When the abdominal muscles are put into strong action, the pressure is distributed over a large space, and cannot have any local injurious effect on the viscera. The injudicious application of tight clothing to the trunk of the body interferes with this process: by preventing the natural swell of the belly in the part which it embraces, it increases the effort in other quarters, and thus has a most direct tendency to cause protrusions. Such must be the operation of the navel bandage, often applied to newly-born infants, but completely unnecessary; of high breeches;

and of petticoats, when they encircle the body closely, and are not supported by braces; and more particularly of stays, when partly or wholly composed of unyielding materials, and tightly laced.

An observation of the wide space in the skeleton, constituting the inferior aperture of the pelvis, which forms also the lower boundary of the abdominal cavity, would lead us to expect in this situation a frequent seat of rupture. Position is here particularly favourable to its occurrence; and a forcible impulse is communicated to the hand at this part, whenever a general pressure is exerted on the abdominal viscera. This opening is filled, in the recent subject, by the sacro-sciatic ligaments, and the levatores ani: the latter muscles forming a broad concave surface, which shuts up the front and sides of the pelvis at this part, and which, by replacing the viscera when protruded by the pressure of straining, constitutes an antagonist power to the respiratory muscles. A strong fascia, continued from the arch of the pubes to the prostate and neck of the bladder, prevents protrusions in that situation; and the bladder and rectum afford a considerable obstacle to the formation of ruptures in this neighbourhood. A descent of the viscera through the great sciatic notch is almost entirely precluded by the space being occupied by the pyriformis muscle, and the vessels and nerve which go through the opening.

The predisposing cause of ruptures has been referred to a naturally greater size of the openings at which they protrude; to a weakness and relaxation

of the margins of these apertures ; and to a preternatural laxity of the peritoneum*. The former circumstance has probably a chief operation ; since in males, where the abdominal ring is naturally capacious, inguinal herniæ occur in a very large proportion, while the femoral species is very rare ; females, on the contrary, having the capacities of these apertures reversed, are seldom affected with inguinal ruptures. Without, however, attempting to decide what is the true reason, it may be safely asserted, that particular subjects manifest an unquestionable disposition to the complaint. In such persons a very slight occasional cause, such as the act of coughing or sneezing, will bring on a rupture ; the complaint, indeed, appears sometimes spontaneously. “ I know,” says RICHTER†, “ a savant, who leads a sedentary life, and in whom an inguinal hernia appeared suddenly some time ago. I applied a bandage, and in a few weeks a similar hernia came on the opposite side ; a bandage was applied to this also ; and in a very short time a crural hernia made its appearance. I have seen several similar cases ; and have known four or even

* “ Cette foiblesse, cause prédisposante des hernies, consiste, ou en une laxité contre nature du péritoine, qui, dans les endroits, où il n'est pas soutenue par les muscles du bas-ventre, comme à l'anneau, cède à la distension : ou en un relâchement et une extensibilité contre nature du mésentère, et de toutes les parties, qui maintiennent les viscères du bas-ventre dans leur situation.” RICHTER, *Tr. des Hern.* p. 10.

† *Traité des Hernies*, p. 9.

five herniæ come in the same subject, without the least occasional cause." The necessity of admitting some original difference of structure favourable to the occurrence of ruptures is apparent from this consideration, *viz.* that the openings exist in all subjects, and the occasional causes are applied in all individuals; but the effect is only partial.

When it is stated, that hernia has sometimes appeared to be hereditary, the meaning of the observation must be, that there is a certain weakness in the original formation of the parts, predisposing to the complaint, and that this defect may descend to the offspring; and in this sense its truth cannot be disputed*. I believe that the word *hereditary*, in its application to disease, has been always used according to this interpretation; and that the employment of it in its strict sense has only been suggested by those, who wished to shew their ingenuity in refuting an absurdity of their own creation.

The dilatation of the openings, through which herniæ take place, in consequence of the distension of the abdominal parietes during pregnancy, accounts for the greater frequency of ruptures in ge-

* " Ou ne peut point nier, que cette cause prédisposante des hernies ne soit héréditaire : je ne prétends pas plus que des pères attaqués des hernies engendrent toujours des enfans, qui seront affectés de cette maladie, que je ne pretends, qu'ils engendrent toujours des enfans, qui leur ressemblent : mais on observe quelquefois l'un et l'autre. J'ai vû des hernies survenues spontanément et sans aucune cause extérieure à des enfans, dont les pères avoient des hernies."

neral, and of the exomphalos in particular, in women who have borne children. The occurrence of umbilical hernia, after dropsy, may be explained on the same ground.

The ruptures which appear after debilitating diseases, and those which occur in persons, who, from a state of corpulency, become suddenly emaciated, must be referred to weakness.

CASE.

A FRIEND of mine met with a remarkable instance of the latter kind in a French emigrant: the danger, anxiety, and fatigue which this unfortunate gentleman experienced in escaping from his native country, and the extreme indigence to which he found himself reduced on his arrival in England, reduced him from the *en-bon-point*, which the luxurious table of affluence had produced, to a state of considerable emaciation; and a hernia took place at each groin.

Penetrating wounds of the abdominal parietes have been considered as strongly predisposing to herniæ. Such cases are not sufficiently common in general practice, to enable me to decide. I do not remember to have seen this effect produced in any instance. RICHERAND observes, on this subject, that herniæ seldom fail to occur, however firm the cicatrix may be, unless a bandage be employed as a means of prevention: and that they may be ex-

pected with certainty after any considerable bruise, which destroys the powers of resistance (ressort) of the parietes*. He mentions a case in which there was a sabre wound, about an inch in length, in the right hypochondrium, which healed regularly. The patient wore no bandage after his recovery, and at the end of eighteen months there was a hernial swelling, equal in size to two fists. This could be easily replaced and retained†.

Those attitudes of the body, in which the tendinous apertures at the ring and crural arch are stretched, as when the trunk is thrown backwards on the thighs, and the chest extended on the pelvis, are favourable to the occurrence of ruptures; because the abdominal muscles, in this tense state, both enlarge the apertures, and press on the viscera. A strong exertion of the respiratory powers, in such a position, is very likely to cause a rupture. In violent horse exercise, particularly without stirrups, this attitude, and the exertions of the abdominal muscles, concur, with the perpendicular pressure of the viscera, to cause protrusions at the groin, or crural arch. Hence cavalry are ruptured in a much greater proportion than foot soldiers.

From the circumstances just explained, a particular manœuvre, practised by the infantry, in which the men suddenly sunk on one knee, keeping the

* *Nosographie Chirurg.* t. iii, p. 317.

† *Ibid.* p. 319. A case of ventral hernia following the wound made for evacuating an abscess in the abdomen, is mentioned in the first vol. of SCHMUCKER'S *Miscellaneous Writings*, p. 197.

trunk erect, was found very injurious by producing ruptures. SOEEMMERRING* states, that more than twenty recruits were ruptured in this way, on one occasion, at Mentz; all of them fine, healthy, stout peasant lads. Their high and tight breeches, and closely fastened circular belts, by compressing the upper part of the belly, considerably increased the danger.

It would be useless to enumerate every trivial circumstance, which may occasionally contribute to the formation of a rupture. The preceding general view will enable the reader to understand the subject sufficiently. Some of the causes, assigned by systematic writers, are totally inadequate, and even ridiculous. In the respectable work of RICHTER, which deserves, on the whole, much commendation, the origin of herniæ is attributed to the use of relaxing and aqueous liquors, of fat and oily kinds of food; to moisture of the climate, &c. Fish, coffee†, potatoes‡, and even

* *Ueber Ursache und Verhütung der Nabel — und Leistenbrüche*, p. 41.

† SOEEMMERRING, *über Ursache und Verhütung*, &c. p. 52.

‡ The following curious specimen of pathology, in which such injurious effects are ascribed to their favourite and principal article of diet, will probably amuse our Lancashire and Irish fellow-countrymen.

“ Inasmuch as potatoes are an indigestible kind of food, distending the intestinal canal, without affording sufficient aliment, and, according to general opinion, by producing a coarse kind of chyle, cause swellings of the mesenteric glands, they appear to debilitate the digestive organs, and thus to cause a pre-disposi-

milk*, have not escaped the imputation of favouring the formation of these complaints.

Herniæ, which originate in predisposition, generally come on gradually, and almost imperceptibly; while those which are produced by bodily exertion are formed suddenly, and by the immediate action of the exciting cause. The occurrence of the complaint is often indicated in the first instance by a fulness, combined with a sense of weakness and uneasiness about the abdominal ring. The swelling is increased by any action of the respiratory muscles, and is therefore rendered more sensible by coughing or holding the breath, and disappears on

tion to ruptures, particularly as country children eat them now more commonly, and in a worse state, than heretofore.”—SOE-MERRING, *über Ursache und Verhütung der Nabel—und Leistenbrüche*, p. 58.

* BLUMENBACH assigns, as one reason for the general prevalence of ruptures among the Swiss, their constant and almost exclusive employment of articles of food derived from milk, which they have the art of varying, by different modes of preparation, to a very great degree. Whey is their common drink. In many of the higher parts of the Appenzell Alps, you get nothing to eat but old cheese, with new cheese instead of bread. Probably, he adds, the milk diet of the Dutch is a principal reason of the great number of ruptures observed among them.—*Medicinische Bibliothek*, vol. i, p. 729.

It seems strange, that a single Irishman should escape the united operation of the milk and potatoes. Since, however, ruptures are by no means particularly frequent in Ireland, where nineteen-twentieths of the population subsist on those very articles, either its natives must enjoy some peculiar exemption, or the learned writers quoted above must be mistaken.

pressure, and in the recumbent position of the body. It gradually finds its way through the tendon of the external oblique muscle into the groin, and afterwards into the scrotum. When a hernia takes place suddenly, it is generally attended with a sensation of something giving way at the part, and with pain.

CHAPTER III.

SYMPTOMS OF RUPTURES IN THEIR VARIOUS STATES.

SECTION I.

Symptoms of a reducible Rupture.

WHEN the contents of a rupture experience no pressure from the margins of the opening, through which they have passed, their functions are little, if at all, impeded; the description of the disease consists, therefore, chiefly in an enumeration of the sensible characters of the tumour. When, on the contrary, the hernia is strangulated, the natural offices of the protruded parts are entirely suspended; hence various dangers and alarming symptoms ensue, by which the character of the complaint is completely changed.

If we meet in any of the usual seats of herniæ, as the groin, scrotum, labia pudendi, or navel, with an indolent tumour, fixed at its basis, either soft, or more tense and elastic, without change in the colour of the skin, which is moveable, and can be pinched up into folds and elevated; and if it have arisen under the circumstances generally attending the formation of this complaint, we naturally ascribe its origin to a protrusion of the abdominal viscera.

Our suspicion is converted into certainty, if we find that the swelling varies in size ; being smaller in the recumbent position, larger in the erect posture, or when the patient holds his breath ; diminishing, or entirely disappearing by means of pressure, and enlarging again when this pressure has ceased ; if it be large and tense after long standing, much exercise, or straining, after a meal, or when the patient is troubled with wind, soft and small in the morning, before he has taken any food : if, since the commencement of the complaint, he have been troubled with any affections, arising from the unnatural situation of the viscera, as colic, constipation, or vomiting ; if he perceive occasionally a rumbling sensation in the tumour, particularly on its return ; and lastly, if it become tense when he coughs, so that an impulse is communicated to the hand of the examiner.

The tumour goes up of itself, or on the slightest pressure, in the lying position ; it may be returned, when the patient is erect, by pressing it more or less forcibly. The natural opening in the abdominal parietes, to which the tumour corresponds, being occupied by a soft body, cannot be recognised before its replacement ; but, in general, we can distinguish it afterwards, and even sometimes introduce the finger, so as to find that it is dilated.

These, which may be called the general symptoms of hernia, are not all observable in every species and state of the complaint : each kind has its particular signs, as I shall explain hereafter. But

in most instances, the circumstances which have preceded or accompanied its origin, and the affections, which have followed its appearance, will enable the surgeon to determine the nature of the tumour.

The symptoms of the case will sometimes inform us what are the contained parts. This discrimination, indeed, is often difficult, and even impossible, when the hernia is old, large, and very tense. For the viscera in such ruptures experience considerable changes in their figure and state, while the thickened hernial sac prevents an accurate examination by the hand. Again, it is frequently difficult to determine the contents of a very small hernia.

If the surface of the tumour be uniform ; if it be elastic to the touch ; if it become tense and enlarged when the patient is troubled with wind, holds his breath, or coughs ; if, in the latter case, the tumour feel as if it were inflated ; if the part return with a peculiar noise, and pass through the opening at once, the contents of the swelling are intestine. If the tumour be compressible ; if it feel flabby, and uneven on the surface ; if it be free from tension, under the circumstances just enumerated ; if it return without any noise, and pass up very gradually, the case may be considered an epiplocele.

The smooth and slippery surface of the intestine makes its reduction easier ; and the mixture of air with the intestinal contents, causes, when they are pressed up, a peculiar gurgling noise (*gargouillement* of the French). The reduction of the omen-

tum is more difficult, since it is soft and uneven, and its surface becomes moulded by the surrounding parts. If a portion of the contents slip up quickly, and with noise, leaving behind something which is less easily reduced, the case is probably an entero-epiplocele.

The circumstances above enumerated do not enable us to determine, in all cases, what are the contents of a rupture. PETIT, after stating, with the candour characteristic of true science, that he had been frequently mistaken in his opinion, delivers the following very sensible observations, which it will be well for the young practitioner to bear in mind on other occasions, as well as the present:—

“ Let young surgeons acquire a habit of caution from what I now say; let them reflect before they speak or act, and remember, that there is often a great difference between what a person really sees, and what he fancies that he sees. Speaking too hastily may be followed by bitter regret; but we very seldom repent of having been silent. Those who run after reputation do not always overtake it: the merit on which it is founded is like fruit, which ought not to be gathered until it has attained maturity*.

“ I have experienced what I say more than once, and doubt not that others have met with similar occurrences. From having been deceived in my judgment, I am no longer so ready to offer a prog-

* *Tr. des Malad. Chirurg.* t. ii, p. 311.

nosis; for, by the confession of the greatest practitioners, few herniæ resemble each other exactly. Those, who have not seen much, will not be disposed to believe what I say; they will imagine that nothing more is required, in order to determine the nature of a rupture, than to know what authors state concerning the signs which indicate the presence of intestine or omentum; but they deceive themselves*.”

The circumstances, which have just been enumerated, characterize the complaint so perfectly, that no doubt can exist as to its nature; there can be no fear of confounding it with other disorders, if we advert to their origin, progress, and symptoms. The nature of the case is more doubtful, if the swelling be small and deeply seated; if it have arisen gradually; if it be connected with other tumours; if it contain much fluid, and the patient be fat. Here the greatest attention and discernment are required on the part of the surgeon; his opinion must be guided rather by the symptoms, than by the characters of the tumour.

A reducible hernia, though attended with no immediate danger, occasions much trouble to the patient, particularly if it be allowed to proceed unrestrained by surgical treatment: and the inconvenience increases constantly with the size of the tumour. The portion of intestine or omentum, which has left the abdomen, produces various complaints

* *Tr. des Malad. Chirur.* p. 308.

from its connection with the parts within. From this source of irritation proceed nausea and vomiting, indigestion and colic. As the viscera become accustomed to their unnatural situation, these symptoms gradually wear away. Still, as the tumour constantly increases in size, a large part of the viscera is deprived of that pressure and support, which they naturally derive from the respiratory muscles; the passage of the food through the alimentary canal becomes difficult and protracted; and hence large ruptures are almost invariably attended with flatulence and constipation. The patient is precluded from all active and laborious employments, and from all considerable exertions, which necessarily augment the tumour, and are attended with great risk of more immediate danger, by forcing down fresh parts, so as to cause strangulation. The opening, through which the viscera pass out, must subject them to more or less pressure; which will enable us to account for that effusion of fluid into the cavity of the sac, which is generally observed in old ruptures; and for the formation of those adhesions of the parts to each other, and to the hernial sac, which change the case from a reducible swelling, to one which will no longer admit of reduction. Since the opening becomes enlarged by the protruded parts, and the pressure on the viscera, which causes the descent, is frequently renewed, additions to the tumour take place very readily. In situations, where position is favourable, and the surrounding parts offer no obstacle, as in

the scrotum, the only limit to the possible bulk of a rupture arises from the connection of the parts within. Instances are not uncommon where all the moveable viscera have been contained in such a swelling; and even those, which are more fixed, may be gradually displaced by the constant dragging of organs connected with them.

SECTION II.

Symptoms of a strangulated Rupture.

THE immediate effects of such a degree of pressure, as prevents the return of the protruded parts, are, an obstruction to the passage of the intestinal contents, and consequent want of fecal evacuations, and inflammation of the strangulated part. The former symptom may not be so clearly marked, where a part only of the diameter of the gut is strangulated, but it will often occur to as great a degree in that case, and will be equally insuperable by purgative medicines*, as where a complete fold of intestine is in-

* MORGAGNI mentions a case, in which a part only of the diameter was included, where the stools were not suppressed; yet it ended fatally; *De causis et sed.* Ep. xxxiv, Art. xv. Many instances are recorded in which the constipation has been complete. *Mém. de l'Acad. de Chirurg.* tom. iii, p. 151; *London Med. Obs. and Enquiries*, vol. iv, p. 178 and 355; *Philosophical Magazine*, vol. xxxi, p. 214, et seq.; DE HAEN *Ratio Medendi*, p. ii, c. iv.

A patient of MORGAGNI's died on the sixth day, after constipa-

cluded : it even happens occasionally in a mere epiplocele, where no intestine at all is protruded. Hence it must be referred rather to that inflammatory affection of the intestines, which subsists in this complaint, than to the mechanical obstruction of the canal ; and must be considered as analogous to the constipation, which prevails in ileus when produced by other causes. The action of a clyster on the bowels below the stricture often produces a stool after the strangulation has taken place. But when these have been once emptied, the most irritating clysters produce no effect.

The inflammation of the protruded viscera causes a thickening of their coats, an effusion of fluid into the hernial sac, and adhesions of the parts to each other, and to the containing bag. When it is particularly violent, a layer of coagulating lymph is sometimes thrown out on the surface of the intestine.

The coats of the intestine are seriously injured by the mechanical pressure of the stricture, more particularly when the protrusion is wholly intestinal. A manifest impression is often made on the gut, as if it had been firmly tied by a small hard cord ; it will be found on close examination, that the internal coats are ulcerated, and thus the gut is so much weakened, that a slight force, such as that necessa-

tion continuing for the whole time ; the entire diameter of the intestine here was unobstructed, the protruded part being merely a diverticulum.—Ep. xxxiv, art. xviii. He quotes a similar case from BENEVOLO *Due Relazioni Chirurg.* art. xix.

rily employed in handling and returning the parts, occasions it to give way ; or it may burst after being replaced, giving issue, in either case, to its contents. The pressure sometimes causes constriction of the canal, without any division or weakening of its sides *. Some further remarks on this subject will be found in chapter xvi, among the observations on the operation for strangulated femoral hernia.

The strangulation terminates, unless the stricture be previously removed, in gangrene. These, which we may call the *primary* effects of the incarceration, are accompanied by other symptoms, arising from disorder of the parts, which sympathize with the hernia.

In an incarcerated intestinal rupture, the tumour, which was before indolent, becomes painful ; the pain is most acute at the strictured portion, and extends from that situation over the rest of the swelling and abdomen ; these parts becoming at the same time swoln and tense. A feeling of tightness, as if from a cord drawn across the upper part of the belly, is often one of the earliest symptoms of

* In a patient, who died with insuperable constipation, and all the symptoms of ileus, I found the small intestine surrounded at one point by a preternatural adhesion, consisting of a firm and roundish cord. The canal was here permanently contracted, so as not to exceed a large quill in diameter. M. RITSCH found it completely closed in a case of hernia. *Mem. de l'Acad. de Chirurg.* tom. iv. *Sur un Effet peu connu de l'etranglement dans la hernie intestinale.* See also MONRO on *Crural Hernia*, p. 17, and pl. v, fig. ii. The colon so contracted that it would not admit the finger, without any inflammation. SCARPA, p. 116.

strangulation. The pain, which at first is not constant, becomes in the sequel fixed; and is augmented by external pressure, coughing, sneezing, or other agitations of the body. The evacuations *per anum* are entirely suppressed, and nausea and vomiting ensue: all the contents of the stomach, and afterwards those of the intestine, down to the stricture, being rejected*. These symptoms, which often remit for a considerable period, are accompanied by a proportionate derangement of the whole system. There is great anxiety and restlessness, with a small quick and hard pulse, and coldness of the extremities. The pulse cannot be at all depended on, as indicating the degree of general fever. It may be even slower than in health, when the patient is in the greatest danger. Neither does the degree of heat, as ascertained by our examination, or indicated by the patient's sensations, correspond to that of fevers in general: on the contrary, there is a disposition to cold sweats, and cold state of the extremities. After a time hiccough.

* This constitutes what is termed *stercoraceous* vomiting: it consists, probably, in general, of the contents of the small intestines. A consideration of the *valvula coli* would induce us to suppose that the contents of the large intestine could not pass into the small: but repeated observation has shown, that this valve does not offer an insuperable obstacle. “*Probatissimi auctores hoc observaverunt, et ipse manifestè vidi,*” says HALLER.

HEBERDEN has seen clysters vomited up in a case of hernia; and adds, that he has frequently witnessed it in ileus. *Medical Transactions*, vol. ii, p. 514. The testimony of DE HAËN may also be quoted. *Rat. Med.* part ii.

supervenes, the pulse becomes so small as to be hardly sensible, the respiration is weak, and the whole body is covered by a cold and clammy sweat. Mortification now takes place : it begins in the contents of the rupture, and extends to the containing and neighbouring parts. The degree and intensity of the symptoms are modified by various circumstances, as the age and strength of the patient, the nature of the strangulation, &c. The duration of the complaint, from its first commencement to the termination in mortification or death, is also extremely various.

An epiplocele is much less liable to strangulation than an intestinal rupture, and its symptoms are milder and slower in their progress. In this variety of the complaint, stools may generally be procured by purgative medicines or clysters. The connection of the omentum with the stomach induces hiccough and sickness, and although the latter symptom seldom proceeds to stercoraceous vomiting, it exists to a most distressing degree, and particularly characterizes the complaint. The symptoms are often influenced by the position of the body, being mitigated by bending, and aggravated by straightening the trunk. An epiplocele is occasionally accompanied with all the dangerous and alarming symptoms of an intestinal rupture, as insuperable constipation, fecal vomiting, &c.

The examination of a patient, who dies while labouring under a strangulated hernia, discloses such a state of parts as the symptoms just enumerated

would naturally lead us to expect. The whole surface of the peritoneum is inflamed, and the intestines participate in this disorder, particularly the portion of the canal above the stricture, which is distended considerably beyond its natural diameter. From the constricted part downwards, the intestine is generally smaller than usual, and not inflamed. The convolutions of the intestinal canal are agglutinated by a recent deposition of coagulating lymph; and a turbid puriform fluid, with coagulated flakes, is effused into the abdomen; streaks of a bright red colour, consisting of an aggregation of minute vessels, cross the intestines in different directions; and spots of gangrene are not unfrequently observed. All these circumstances show us most decidedly, that the effects caused by strangulation are of the most active inflammatory kind. We must regard the stricture, which the protruded parts experience, as the immediate cause of this disorder.

The distinction of strangulation from affections, which may resemble it more or less nearly, requires considerable attention and judgment. The intestine included in a large hernia may be affected with colic, and thus give rise to constipation and vomiting. This may be the more easily mistaken for strangulation, if the parts are adherent, and incapable of reduction. Such an attack may render a reducible hernia incapable of being replaced; particularly if the bowels are much inflated. Clysters and oily purgatives will produce stools under these

circumstances; and thereby throw light on the real nature of the case.

The first appearance of a rupture may occasion hiccough, vomiting, and pain: and the same symptoms may be exhibited in an old case, after the patient has taken much exercise, or remained long in the erect posture, in consequence of irritation excited by the protruded viscera in the contents of the abdomen. Here, too, stools may be easily procured by purgatives.

The most important case, however, is where a patient with a rupture has an attack of ileus from some other cause, in which the original complaint is not at all concerned. The operation, performed on the supposition that the symptoms arise from the hernia, would here be not only useless, but even injurious; and the surgeon would neglect those means, which the inflammation of the bowels so urgently demands.

Wherever we see a patient labouring under the symptoms of ileus, we should suspect the existence of a rupture, and make those inquiries and examinations, which such a suspicion would naturally suggest, particularly in females, who are often led to concealment by false delicacy. A superficial examination is not sufficient on these occasions; as a very small portion of intestine, not forming any external tumour, may, by its incarceration, cause the symptoms. If the latter have appeared suddenly, and under circumstances which might cause a

rupture; if the pain have been first felt about the ring or crural arch, and if pressure in these situations increase it; and, lastly, if the patient, shortly before, had been in perfect health, there is strong reason to suspect the existence of a hernia.

When a person labouring under ileus has a hernia, which can be reduced easily, there is no ground for doubt; if, on the contrary, the parts cannot be replaced, strangulation may be reasonably suspected, although we cannot immediately conclude, with certainty, that the swelling is the cause of the inflammation. We should first ascertain whether the parts could be replaced previously to the attack; if they could not, and the swelling be large and old, they are probably adherent; and the impossibility of reduction proves nothing. If they could be returned, and particularly a short time before the access of the symptoms, strangulation may be suspected with justice; but it is still not quite certain. The two following cases, related by Mr. POTT*, show the possibility of mistake, and will forcibly inculcate the necessity of a minute attention to the circumstances.

CASE I.

“ An old gentleman, who had for many years had an irreturnable rupture of the mixed kind, and which I had often seen, was seized with the symptoms of an obstruction in the intestinal canal.

* *Works*, vol. iii, p. 304 and 307; edition of 1783.

“ He complained of great pain in his whole belly, but particularly about his navel; he was hot and restless, and had a frequent inclination to vomit; his pulse was full, hard, and frequent; and he had gone, contrary to his usual custom, three days without a stool.

“ I examined his rupture very carefully; the process was large and full, as usual, but not at all tense or painful upon being handled; his belly was much swollen and hard, and he could hardly bear the light pressure of a hand about his navel. Upon mature consideration of the whole, I was of opinion, that his rupture had no share in his present complaints. But as some of his symptoms resembled those of a stricture, I desired that more advice might be had. A physician and surgeon were called: I gave them an account of what I had seen of the case, of my opinion concerning the irreducibility of the rupture, and that it had no share in the present complaint; at the same time desiring my colleague to examine for himself. We tried at reduction without success; but he thought that there was still a stricture. The Doctor ordered bleeding, clysters, and cathartics: the last were immediately rejected by vomit, and the clyster came away without any mixture of fæces. Bleeding was repeated *ad deliquium*, the tobacco smoke was injected, but all to no purpose. The operation was proposed, but as the case did not appear to me to require it, I could not second the motion; it was, however, mentioned to the patient, who would not consent, unless I would say that I

thought it necessary, and believed it would be successful: I could not say either, because I believed neither. Every thing else that art could suggest or practise was tried; but on the sixth day he died.

“As it had been supposed that I was wrong and positive, I was very glad that his friends chose to have him opened.

“The hernial sac was thick and hard, and contained a large portion of omentum, a piece of the ileum, and a portion of the colon, all perfectly sound, free from inflammation or stricture, and irreturnable only from quantity. But the intestine jejunum was greatly distended, highly inflamed, and in some parts sphacelated.”

CASE II.

“JOHN DEWELL, a man about thirty, was brought into St. Bartholomew's, labouring, as was supposed, under an incarcerated hernia. He had not had a stool for three days, although he had taken both purges and clysters; he vomited almost incessantly, his pulse was hard and frequent, but not full, and his countenance bespoke death.

“He had a rupture; it was on the right side, was clearly intestinal, was soft, easy, occasioned no pain upon being handled, and seemed to be capable of reduction; but, after many trials, I found that I could not accomplish that end, notwithstanding I used my utmost endeavours; all which gave the man no uneasiness, and therefore satisfied me, that

his symptoms did not arise from his hernia, which was also the patient's own opinion.

"MR. NURSE coming into the ward, I desired him to look at the man: he thought, that, notwithstanding the seemingly quiet state of the rupture, a small portion of the gut might be so engaged, as to cause his present mischief, and therefore that the operation was warrantable and proper.

"Supposing it to be right at all, it could not be done too soon, and therefore we set about it immediately.

"The hernial sac was formed by the tunica vaginalis; it contained a portion of intestine ileum, which had contracted a slight cohesion with the testicle, but was so perfectly free from stricture, that when we had loosened it from its connection, we returned it into the belly without dividing the tendon.

"I was indeed afraid that the man would have died before we could have got him to bed, but he lived till the next day.

"A portion of the colon within the belly had been in a state of inflammation, was now plainly mortified, and quite black."

The following circumstances will enable the practitioner to decide, in similar cases, that the symptoms are not produced by the hernia; that it is not strangulated; and that the ileus arises from an internal cause. The pain is felt in the abdomen, and not in the swelling, which continues soft, while the belly is inflated, hard, and tense. The attack

is sudden, and not preceded by any of the occasional causes, which could affect the rupture; and the ring is free. The affection extends in the sequel to the swelling, which then becomes painful and tense: but it appears later here than in the belly, and does not proceed to so great a degree.

The most embarrassing case of all is where inflammation attacks the protruded parts, but is entirely independent of the rupture. The occurrence is rare, but very possible; since the intestines included in a hernia are exposed to the same causes of disease as in their natural situation. It may be expected to happen principally in large herniæ: the swelling is the seat, and not the cause of the disease. The distinction must be very difficult. The want of tension, and of pain at the ring, while the swelling itself was painful: and the previous attack of feverish rigor might lead us to suspect inflammation of the protruded intestine. If the ring afterwards became tense, and the included parts considerably painful, we should conclude that strangulation had supervened, and act accordingly.

CHAPTER IV.

CAUSES, AND DIFFERENT SPECIES OF STRANGULATION; AND PROGNOSIS OF STRANGULATED HERNIA.

SECTION I.

Causes of Strangulation.

THAT the symptoms of strangulated hernia arise from the pressure of the stricture on the protruded parts; and that this cause is not only adequate to that effect, but, indeed, the only one that can be assigned, is too clear to admit of any doubt. Systematic writers have distinguished the causes of incarceration, as consisting either in a diminished capacity of the opening, or in the intrusion of additional parts into the aperture. This distinction would not be a very important one, if it were well founded, since the presence of either of these circumstances must imply relatively that of the other. I believe, however, that the former can hardly be admitted as a cause of strangulation. The openings through which herniæ generally protrude, being tendinous, cannot contract, or diminish in capacity: hence the term *stricture*, equivalent to contraction or narrowing, is objectionable. The parts

are increased in bulk, and the ring feels tense; hence it is found to be actually *dilated*; larger indeed than in health. The term stricture has led to erroneous practice, to the use of emollients, and such topical remedies as are supposed to possess the power of relaxing; whereas we should attempt to reduce the bulk of the parts. The tendinous openings through which herniæ generally protrude, cannot, by their nature, undergo much change; and particularly do not admit of contraction. The protruded parts, however, are capable of considerable enlargement; and the tendons can produce passively as complete a constrictive effect as if they had possessed the most unequivocal powers of active contraction. A portion of intestine, or omentum, pushed suddenly by a violent effort through the abdominal ring, may be immediately strangulated. A piece of bowel forced down in an omental rupture, a new portion protruded in an old intestinal hernia, or the distension of the contained intestine by its contents, whether of food or air, will so fill up the ring as to produce incarceration. In all these cases, the symptoms cease immediately on reduction, or on the division of the ring, which proves clearly the nature of the cause.

It may be a question, whether the stricture produces its injurious effects, that is, the peritoneal inflammation, which supervenes, sooner or later, by direct irritation of the parts included, or more indirectly, by obstructing the intestinal contents. In

his very able work*, on injuries of the intestines, which has thrown so much light on all the interesting and important points connected with that subject, my friend Mr. TRAVERS, of St. Thomas's Hospital, adopts exclusively the latter explanation. In support of this opinion he observes, that the symptoms of strangulated hernia cannot be distinguished from those of mechanical obstruction unconnected with pressure; and that the inflammation is exactly the same with that which follows obstruction of the canal in ileus. The well-known fact, that simple epiplocele often produces all the symptoms of an incarcerated intestine, and the extremely rapid progress of acute incarceration, as exemplified in the cases mentioned in the next section, compared with the continuance of simple constipation for days and weeks, without causing inflammation, makes me hesitate in excluding the stricture on the gut from all share in the mischiefs of incarceration, and ascribing them solely to fecal obstruction. I doubt, too, in the case of enteritis, whether the constipation be not the consequence, and not the cause of the inflammation. That the sufferings are, in all instances, aggravated by accumulation in the canal above the stricture, and signally relieved when that can be removed; and that, in many cases, intestinal obstruction, slowly advancing, is the sole cause of mischief, will be readily granted. On the other

* Chapter v.

hand, it is equally obvious that the symptoms of strangulation frequently come on with a rapidity, and proceed to a degree of severity, which bear no proportion to any actual or possible accumulation; and that slight mechanical injury, unattended with fecal obstruction, gives rise sometimes to dangerous and even fatal inflammation. We may expect on this, as on other occasions, that the effect of the local irritation will vary according to the condition of the constitution, and of the intestinal functions, in different persons, or in the same individual.

The stricture is most frequently produced by the tendinous aperture; but that sometimes remains loose and free, the pressure being caused by the mouth or neck of the sac. When these are thickened and indurated, as I have described, in the first chapter, sect. iii, they form a firm ring, fibrous and sometimes almost cartilaginous, fully adequate to cause effectual compression on the protruded viscera. The possibility of constriction by the neck of the sac alone is farther illustrated by the observations in the next chapter, on the return of the rupture with the sac, by the facts mentioned in chapter viii, sect. ii, and by two cases mentioned in the section on the operation for strangulated femoral hernia, in which the parts were returned, still compressed by the neck of the sac.

It is less common to find the cause of stricture in those constrictions of the hernial sac, which are found exterior to the ring. Yet such cases are occasionally seen. Instances of this kind are men-

tioned in the chapter on hernia congenita. I lately met with a large and old entero-epiplocele, towards the bottom of which was a round opening, with a thick and hard margin, leading into an inferior division of the sac. The omentum had passed through this, and become firmly adherent to the lower part; and an intestine might have been easily strangulated in the aperture. SCARPA has met with constriction of the sac in an operation, and on the dead subject*.

It must generally be impossible to determine the seat of stricture, previously to an operation; and no practical advantage could be derived from ascertaining this point. We may observe, however, that when a hernia is incarcerated, at the moment of its formation, there can be no doubt that the pressure is made by the border of the tendinous aperture; and if the patient has never worn a truss, the same observation will probably hold good. When, however, an old rupture, which has been long retained by a truss, is again protruded, and strangulated, the neck of the sac may probably be the cause, in consequence of its having become thickened and contracted by the pressure. And hence arises the danger which a patient incurs by neglecting the use of a truss, after having worn it for some time. SCARPA has observed, that the contraction of the neck of the sac is most common in such cases.

* P. 119, and fig. iv, pl. vi.

† P. 113.

Some other rare kinds of strangulation have been noticed by surgical authors. It has been produced by preternatural adhesions of the parts^{*}; by a fissure in the omentum[†]; by the pressure of that part in a hardened state; by various foreign bodies, which had been previously swallowed[‡]; by worms, &c. None of these causes can be ascertained previously to an operation, or to the patient's death, and are, therefore, of no practical importance §.

SECTION II.

Different Species of Strangulation.

AN important distinction arises from the nature and general symptoms of the case; in compliance with which, we discriminate between the acute or inflammatory, and the chronic or slow kinds of strangulation. This, indeed, is highly useful, as it com-

* Of the appendix vermiformis; SCARPA, p. 144; LAFAYE, *Acad. de Chirurg.* t. iii.

† *Acta Havniensia*, vol. i; ARNAUD, *Mem. de Choir.* vol. ii; p. 569, 574, 587, 590.

‡ RICHTER, *Tr. des Hernies*, p. 47; MORAND, *Opuscles de Chirurgie*, pt. ii, p. 165; *Acad. des Sciences*, 1728, p. 41.

§ SCARPA describes very minutely various ways in which the omentum has produced strangulation; as by forming a cord fixed to the sac, and going round the intestine; by the intestine passing through a perforation in it; by its forming a mass, adhering to the sac, and pressing on the gut, &c. m. ii. § 15—20.

prehends the characteristic marks of two very different cases, and leads to practical discrimination in their treatment.

The inflammatory strangulation occurs in young and strong patients; in cases, where a rupture is formed suddenly by a great bodily exertion; or where, after having been kept up by a truss for a long time, it is suddenly reproduced by any cause of the same description. It is mostly confined to small herniæ, or to such at least as are of a moderate size. Under the circumstances just enumerated, the opening through which the viscera protrude is small: the pressure on the protruded parts must consequently be great; and hence, in great measure, arises the peculiar character of the case. The symptoms come on suddenly, and their progress is rapid; the swelling is tense and highly painful, particularly at the ring, where the slightest pressure is intolerable; the abdomen quickly becomes painful, and is tense and elastic to the feel: the constitutional affection partakes of the inflammatory character. So quickly does the complaint run through its stages in this case, that gangrene has been known to occur in less than twenty-four* hours from the expulsion of the intestine.

* WILMER'S *Practical Observations on Herniæ*, p. 74; POTT'S *Treatise on Ruptures*, in his works, vol. ii, p. 94, edition of 1783. The latter writer mentions another instance, in which a bubonocoele terminated fatally in less than a day. (*Ibid.* p. 85.) Mr. HEY has twice seen patients die of hernia within twenty-four hours. (*Practical Observations*, p. 142.) In a case alluded to

“ A stout young butcher, of sanguine temperament, twenty-eight years old, had a bubonocoele of the size of the fist, formed suddenly in an attempt to lift half an ox. Violent pain came on immediately, and obliged him to go to bed; vomiting and hiccough followed. He was bled largely, and sent to the Hotel Dieu. The ring was quite hard (*dur comme du fer*), the swelling and whole abdomen so acutely sensible, that attempts at reduction were out of the question. The mind was already affected by the intenseness of the pain; face flushed, pulse hard and tense, and breathing hurried. The operation, performed ten hours after the accident, gave a momentary relief; but the hiccough continued, the pulse became thready, and the abdomen inflated. In eleven hours after the operation, his sufferings were ended by death. Redness and agglutination

by Mr. COOPER, eight hours only elapsed between the occurrence of strangulation and the patient's death. (*Anatomy and Surgical Treatment of Inguinal and Congenital Herniæ*, p. 26.) The same author also gives an instance of umbilical hernia, in which the progress to a fatal termination was remarkably rapid. The symptoms were of the most acute and violent description: death happened in seventeen hours and a half after strangulation began; and the integuments had already mortified at one part of the swelling. (*Anatomy and Surgical Treatment of Crural and Umbilical Herniæ*, p. 45.)

A soldier, fatigued by forced marches in Egypt, had a hernia formed and strangulated immediately; he was brought to the “ ambulance” instantly, and perished in two hours with gangrene of the part, and of the abdominal viscera. LARREY'S *Mem. de Chirurg. Milit.* tom. i, p. 196. The second instance he has known of such a rapid progress.

of all the intestinal convolutions, without any effusion of fluid, and gangrene of the parts, which had been protruded, were the appearances observed on examination of the body*.”

The slow strangulation takes place in large and old herniæ, which have been often protruded and replaced, or which have been long unreduced. The contained intestines, removed from their natural situation, and no longer supported by the pressure of the respiratory muscles, are probably rendered somewhat indolent in performing their functions; as patients of this kind are habitually subject to costiveness and intestinal complaints. The contents of the alimentary canal will easily be retained in a situation where they enter the intestine without difficulty, but have their egress obstructed by the force of gravity. The entrance of indigested food, of worms, or of a foreign body, into such a tumour, would be very likely to cause irritation and obstruction, and a consequent accumulation of the intestinal contents. The strangulation arising from such an accumulation constitutes the case, which has been termed by a French writer† “*hernie par engouement des matières.*” The rupture swells slowly, and becomes heavy and hard. The patient is constipated. The abdomen enlarges from the accumulation of the intestinal contents above the stricture.

* PELLETAN, *Clinique Chirurg.* t. iii, p. 364.

† See a Memoir of Mr. GOURSAUD, “sur la différence des causes de l’étranglement des hernies,” in the *Mém. de l’Acad. de Chirurg.* tom. iv.

After some days, the swelling becomes painful, and the patient grows feverish; but the fever is not considerable, neither are the abdomen or tumour ever so painful and tense as in the former species of incarceration. In some cases of this description, a fortnight has elapsed without any considerable morbid alteration having taken place in the protruded parts. LE DRAN* operated on the sixteenth day without finding the contents of the swelling much altered from their natural appearance; and SAVIARD† did the operation with complete success on the twenty-second day from the commencement of the incarceration.

The unusual heaviness and hardness of the tumour, the constipation preceding the pain, and the slow origin and progress of the symptoms, are the peculiar characters of this strangulation. The indication is to unload the intestine. The inflammation, which occurs in the sequel, is a secondary symptom.

The differences, observable in the two very opposite cases just described, admit of easy explanation. In the first, the close pressure of the ring on the prolapsed parts, in a subject prone to inflammation, causes immediately a violent inflammatory derangement of the abdominal viscera. The accumulation of fæces, on the other hand, where the parts and the constitution are in a torpid condition, gives to the disorder the character of a merely mechanical obstruction.

* *Observations de Chirurg.*; Obs. lvii.

† *Nouveau Recueil d'Obs. Chirurg.* Obs. xx, p. 112.

As the description is drawn from the most strongly marked cases, we shall seldom find the difference between the two kinds of strangulation so clearly expressed. The symptoms indeed are often of such a mixed and indefinite nature, that they might be arranged without impropriety under either of the above species.

To the two kinds of strangulation, which I have now described, RICHTER has added a third, under the epithet of *spasmodic*, which he considers to arise from the action of the external oblique muscle. It does not seem to me that this case is sufficiently characterized, nor that any practical benefit can be derived from the distinction. The following passage will show what symptoms this author considers as peculiarly denoting the existence of spasm:—

“ La respiration courte et froide, le ventre tendu, gonflé, et cependant peu douloureux, le froid, et la pâleur de la mort, qu'on remarque au visage, aux extrémités; l'anxiété, l'agitation, le vomissement, le hocquet, le pouls petit et serré ne sont ils pas des preuves manifestes d'une maladie spasmodique? et ces symptômes paroissent souvent dans les premiers momens de l'étranglement*.”

If these are the symptoms of a spasmodic stricture, every rupture which happens may be classed under this description.

RICHTER considers further, that the remissions and exacerbations observable in some cases, the be-

* *Traité des Hernies*, p. 53.

nefit derived from opium, warm-bathing, and other means of the antispasmodic kind, the cases in which examination after death has discovered no signs of inflammation in the protruded parts, and the absence of the circumstances characterizing the other species of incarceration, are strong arguments for the spasmodic nature of the symptoms. He admits, that inflammation will ultimately supervene; and consequently, that those cases, which might at first have been relieved merely by antispasmodics, require, in a later stage, the antiphlogistic treatment. It appears, that the remarks of this excellent surgeon refer rather to a particular stage of the complaint, or to the characters which it assumes in particular constitutions, than to any essential distinction in the nature of the affection. We shall allow, without difficulty, that the first symptoms of strangulation do not proceed from actual inflammation of the bowels; but from irritation affecting these organs: since the replacement of the rupture will produce instant relief. It may be expected, too, that in certain irritable constitutions, this character of the symptoms will be more obvious. Opium will undoubtedly appease the symptoms, and procure a temporary relief; but the cause still remains; and the progress of the case will speedily exhibit inflammation. I do not therefore see a sufficient ground for establishing this distinction, and I think it might even prove injurious, by encouraging an inert treatment in an affection where delay is highly dangerous.

SECTION III.

Prognosis of strangulated Hernia.

IN a case of strangulated hernia, our prognosis will be influenced by the cause of the rupture, by the nature of the incarceration, by the size, situation, and contents of the swelling, and by the age and constitution of the patient.

The pressure on the prolapsed parts will be in proportion to the narrowness and elasticity of the tendinous opening: the progress of the symptoms, the urgency of the danger, and the necessity for employing means of relief, will be increased in the same ratio. The slowness of the case will be according to the largeness of the opening and the weakness of its margins.

A large and old rupture, which seems most formidable on the first view, is in reality attended with much less danger than a small and recent one; and it is more difficult to effect the replacement of a rupture of the latter than of the former description.

“ I think (says MR. HEY), it is not a bad general rule, that the smaller the hernia, the less hope there is of reducing it by the taxis. Long continued efforts to reduce a prolapsed intestine are most likely to succeed in old and large hernias, when no adhesion has taken place*.”

* *Practical Obs.* p. 203.

An old rupture is not readily strangulated, and when it falls into this state, the danger is not imminent; the distension of the opening, previous to incarceration, has so dilated and weakened the parts, that they can no longer produce a close constriction. In a small and recent case, the dimensions of the aperture are unimpaired, and its sides are unyielding: strangulation takes place easily, and the degree of stricture is always considerable.

The danger is greatest, when a rupture is incarcerated at the moment of its formation. *Herniæ*, which arises spontaneously, and, as it seems, merely from predisposing weakness, seldom become strangulated: the stricture, in such cases, is never close, nor are the symptoms violent, because the parts concerned are weak and relaxed.

The opening, through which the parts protrude, is narrower in some situations than in others; the progress of the case will therefore be more rapid, and the danger of the patient more urgent. The aperture is generally very small in femoral hernia: this kind of rupture in men, and the bubonocoele in women, have a particularly narrow entrance. On the same grounds femoral, inguinal, and umbilical ruptures are more dangerous than the ventral, perineal, or vaginal kinds.

An enterocele is much more hazardous to the patient than an omental rupture; for the parts are more sensible, and the due performance of their functions is more essential to the support of life.

The incarceration of a small portion of intestine is the most dangerous, because the opening is narrow, and presses closely, while the whole effect of the pressure is felt by the undefended gut; consequently inflammation appears speedily. When the quantity of intestine is greater, the ring must be more open, and there is a portion of mesentery to partake of the pressure. The omentum protects the intestine more or less in an entero-epiplocele. An incarcerated epiplocele is the least dangerous, and, indeed, is seldom fatal. The sensibility of the omentum is not considerable in the natural state; it can bear much pressure without inconvenience; and it does not ordinarily excite very alarming symptoms when inflamed.

In persons of a robust constitution, and of the adult period of life, the symptoms will partake of the inflammatory character; the ruptures of old subjects are generally of long standing, which, together with the diminished powers of their system, bestows on the complaint a more languid form. It assumes the same appearance in individuals of a weak frame. The herniæ of very young subjects are attended with less danger than of those at a more advanced age, from their organs being more yielding, and because they are less susceptible of acute inflammation. Yet, although they are very rarely strangulated, they are not entirely exempt from this occurrence. Mr. POTT* saw a child of

* *Works*, vol. ii, p. 33.

one year old die of incarcerated rupture. GOOCH* has recorded an instance, which proceeded even to mortification in an infant of ten weeks; and one of six months perished from strangulation, in the hospital at Leyden†.

CASE.

I witnessed a successful operation for scrotal hernia, at St. Bartholomew's hospital, in a child fourteen months of age. This case, which was under the care of Mr. LONG, afforded an exception to the general rule mentioned by Mr. PORT‡ "that all those ruptures, which appear in the scrotum of very young children, are congenial." The parts had descended to the bottom of the scrotum, but were not contained in the tunica vaginalis testis. All the usual means of reduction had been attempted ineffectually, before the operation was resorted to; the contents of the tumour consisted of a portion of large intestine; the sac was very thin, and, though adherent to the surrounding parts, mistaken at first,

* *Surgery*, vol. ii, p. 203. It appears that this case must have suffered strangulation for twenty days before the gut gave way: but at first the fæces were not entirely suppressed. They were afterwards discharged through two openings, which soon healed, and a complete recovery followed. Probably the cæcum had been protruded: but it is not stated on which side the complaint was situated.

† GERARD SANDIFORT, *Tabulæ Anatomicae*: see *Edinb. Journal*, vol. iii, p. 470.

‡ *Works*, vol. ii, p. 23, note.

as it frequently is, for the intestine: the great closeness of the stricture rendered the division of the tendon a matter of some difficulty. The crying of the child forced the gut frequently through the wound in the progress of the cure: but the parts, being supported by sticking plaister, gradually healed. The rupture descended again in a short time.

CHAPTER V.

TREATMENT OF REDUCIBLE RUPTURES.

THE treatment of a reducible rupture comprehends the return of the protruded parts, and their retention within the abdominal cavity by means of an appropriate truss. If this should produce contraction of the sac and ring, or agglutination of the sides of the former, and thus prevent renewal of the 'protrusion, the cure is complete, or radical; it is palliative, or incomplete, if the patient be obliged to wear the truss permanently during the remainder of his life.

So long as the protruded viscera can be made to pass freely into the abdomen, this complaint carries with it no immediate danger to the patient. It may, indeed, be troublesome, both from the bulk of the swelling, and from the intestinal derangements, which the residence of the viscera in their unnatural situation is apt to create; but, independently of these circumstances, it may exist throughout life, without causing more than slight inconvenience. This harmless state of the disorder cannot, however, be at all depended on; as numerous accidental causes may, at any time, bring it into a condition, in which the life of the patient is exposed to the greatest risk. A trifling bodily exertion, by forcing

down an additional quantity of the bowels, an excess in eating or drinking, an indigestion, or any intestinal disorder, may convert the rupture from a reducible to an incarcerated state. Should the patient escape this fate, the unrestrained increase of the swelling constitutes a sure source of future inconvenience and disease. The vast size, to which neglected herniæ sometimes increase, not only prohibits all active exertion; but, by involving, in the male, the integuments of the penis, incapacitates the subject from the act of copulation, and gives rise to excoriation from the discharge of the urine over the swelling*. Probably, too, the testis may be affected by the pressure of a very large scrotal hernia†. Disorders of the intestinal functions invariably attend these large ruptures, and increase in frequency and violence, in proportion to the size of the swelling and age of the patient. All the moveable viscera of the abdomen gradually find their way into the hernial sac, if a rupture be neglected. Numerous instances are recorded, in which the jejunum, ileum, colon, and omentum, have been entirely included. The constant force acts even upon the more fixed parts, and entirely

* See the account quoted from FREYTAG, towards the end of chap. vi, of the great size to which the numerous ruptures of the Swiss peasantry arrived, in consequence of their being almost entirely unprovided with proper means of restraint, and of the dreadful inconvenience and sufferings which they occasioned.

† MORGAGNI *de Caus. et sed. ep.* xxxiii, art. xii; SCHMUCKER *Vermischte Chir. Schriften*, b. iii, p. 195.

changes their relative positions ; thus the stomach is brought into a perpendicular line parallel to the axis of the body ; and its pyloric orifice has been actually within the mouth of the sac. It was drawn down to the pubes in the case of Mr. GIBBON*.

These considerations should render every person, afflicted with a rupture, anxious to get the parts replaced, and to have a proper truss, applied ; and they should lead surgeons to inculcate the necessity of these measures, as forcibly as they can, on the minds of all such as seek relief from their advice.

SECTION I.

The Taxis.

THE replacement of the protruded parts, which the surgeon usually attempts in the first instance, when he sees a case of hernia, is technically called the *Taxis*. Sometimes, indeed, when of moderate size, and containing merely intestine, a rupture will go up of itself on the patient lying down, or on exposure to cold ; but pressure is necessary in most cases. Many ruptures may be returned by applying a gentle compressing force while the patient is

* *Miscellaneous Works*, by Lord SHEFFIELD, 4to, vol. i, p. 229. See also MERY in the *Acad. des Sc.* 1701 ; CARLISLE in *Phil. Trans.* 1766. No. 18.

standing; but the replacement is often more difficult, so as to require that attention be paid to the position of the body, and to other circumstances capable of influencing the chance of success, and that the swelling be subjected to a stronger and more methodical compression.

The abdominal muscles should be relaxed, that they may not resist the replacement of the viscera; and the rupture should be made the highest point of the abdomen, that the return of the parts, and the removal of the other viscera from the neighbourhood of the ring may be favoured by gravity. Hence the patient should be in the recumbent posture, the head being supported by a pillow, and the pelvis raised higher than the shoulders. If the latter be slightly elevated by the pillow under the head, the trunk will be curved, and the abdominal muscles completely relaxed. The pelvis may be raised a little on the side of the rupture. If the latter be of the inguinal or crural kind, the hips and knees should be bent, and the soles of the feet should rest flat on the bed. The thigh of the affected side should be rolled inwards, so as to relax the fascia of the limb and the aponeurosis of the obliquus externus at their junction.

The bladder should be previously emptied; and the alimentary canal ought also to be cleared, if the experience of former attempts, or any other circumstances, should lead us to expect difficulty. The patient should abstain from coughing, holding his

breath, or any similar efforts; and he ought not to raise his head, as he is naturally inclined to do, for the purpose of observing the proceedings.

Since the position now described is the most favourable to the return of the protruded parts, it should be continued, as nearly as circumstances will admit, until the rupture is replaced. These precautions procure us as much room as possible in the abdominal cavity, and assist the reduction, as far as that object can be effected, by the force of gravity.

When things are thus prepared, the surgeon places himself on the ruptured side of the patient, and in a situation which he can occupy without inconvenience for some time, since he has occasion frequently to persist for as much as an hour before he gives up the attempt: and it often happens, that by perseverance in trying various positions and modes of pressure, herniæ are ultimately replaced, which did not yield at all to the first efforts.

We begin with a gentle uniform pressure on the tumour, gradually increasing it, subjecting the whole surface, as well as we can, to the compression, and directing the protruded parts towards the mouth of the sac. It is not necessary, in general, to carry the pressure to such an extent as to cause pain; but we cannot always accomplish our purpose without this unpleasant attendant. Continued moderate force will generally accomplish the point better than violence, which presses the parts in a mass against the tendinous aperture, with risk of bruising and in-

juring them, and thus exposing the patient to new dangers.

The tumour may be grasped with one hand, while the other is placed at the aperture, where it may be employed in facilitating the entrance of the parts, and in keeping up those, which have been already returned. In large ruptures both hands must be employed to subject the entire tumour to the pressure. This method is strongly recommended by PETIT*.

The pressure should be exerted according to the direction in which the protrusion has taken place; that is, directly backwards, or perpendicularly to the surface of the abdomen in umbilical or ventral ruptures; upwards and outwards in the common external inguinal hernia; first backwards, and then upwards and inwards, in femoral herniæ. We should examine into the situation of the mouth of the sac in each case, and direct our pressure accordingly. However, when we have failed in one direction we must try others; and we may sometimes be assisted by a knowledge of the attitude and circumstances, which the patient himself finds most conducive to reduction.

The following manœuvre will sometimes succeed in bubonocoele or scrotal hernia, after the more ordinary methods have failed, particularly when the difficulty seems to be caused by an accumulation of fecal matter. Let the surgeon embrace the neck of

* *Tr. des Mal. Chir.* tom. ii, p. 323—328.

the swelling, close to the tendon, with the finger and thumb of one hand, and carry them downwards with a moderate pressure, so as to remove the contents from the portion next to the ring; this will reduce the size of that part, which he may then attempt to pass into the ring. Indeed, since the obstacle exists at the mouth of the sac, reduction will in general be more easily effected in large ruptures, by pressing the upper part of the tumour towards the ring, than by exerting general pressure over the whole swelling.

If the efforts at reduction, managed according to the above directions, are not attended with success, the following method has been recommended. A strong man, placed in a convenient position near the edge of the bed, supports the lower extremities on his shoulders, so that the patient's head and chest only rest on the bed. Attempts at reduction in this posture are said to have succeeded after every thing else had failed, and have therefore been highly recommended by some surgeons. I cannot fairly appreciate the merits of this proposal, as I have never adopted the practice, nor seen it employed by others. It does not seem to me to promise any advantages that could compensate for the unpleasantness, trouble, and inconvenience inseparably connected with its employment. The proposer of this manœuvre must have expected to accomplish reduction by the mechanical effect, which the weight and dragging of the viscera in the abdomen would have on the protruded parts. The absurdity of this idea must be

immediately perceived by any one, who forms a just notion of the natural state of parts; who is aware that the abdomen is accurately full, and that all its contents are preserved in their relative positions by the pressure of the respiratory muscles; that they cannot therefore fall from one part of the cavity to another, but are probably just in the same place, whether the head or the heels be the most elevated point of the body. Reduction is opposed by the pressure which the protruded parts experience, and this position can neither overcome nor diminish that obstacle.

The return of a piece of intestine is generally, but not always, preceded or accompanied by a peculiar noise, caused by the passage of air through the strictured part. It recedes at first gradually, and then slips up suddenly: often it goes up all at once. The omentum passes slowly to the very last portion, which must be actually pushed through the opening.

If the taxis should not succeed at first, it may often be successfully repeated after the use of the warm bath, bleeding, or cold applications, aided by rest in the horizontal position.

The possibility of returning a hernia, and the ease or difficulty of accomplishing the object, will depend on various circumstances. Those of moderate size are most easily replaced; the small and the large are more difficultly managed. The tendinous opening is narrow in the former, and consequently presses closely on the protruded parts: hence the difficulty

of returning crural herniæ. The same remark is applicable to those suddenly produced, and to such as, after having been long kept up by a truss, come down again from any sudden cause.

When the swelling contains a considerable portion of the abdominal viscera, which have been long out of their natural situation, the cavity becomes accommodated to the diminished bulk of its contents, and resists the return of the protruded parts. When the ring is large, and the swelling pyriform, it goes in and comes out again with the greatest ease, by the mere change of position. In these, and indeed in many other cases, we can carry the finger into the ring, pushing the integuments and sac before it, and inverting them. Thus we can not only determine the size and strength of the tendinous aperture, but we may also sometimes feel the epigastric artery in bubonocèle*.

A contracted mouth of the sac constitutes an obstacle to reduction, preventing the parts from going up suddenly, and only allowing them to be replaced gradually and successively.

In the case of a globular or flattened tumour, there is greater difficulty than with one of an elon-

* “ J’ai, dans plusieurs cas de hernie inguinale, tenté cette expérience avec succès, et déterminé la position de l’artère épigastrique, parfaitement reconnoissable à ses pulsations. J’ai vu également, sur une jeune fille amenée à la consultation de Mr. le Professeur DUBOIS, une petite hernie ombilicale, dont la peau se renversait du côté de l’abdomen avec le sac, et formait une cavité, qui recevait le doigt.” J. CLOQUET, *Rech. sur les Causes et l’Anat.* p. 108, note.

gated or pyriform shape. The parts, which slip easily along the inclined surface of the latter, towards its mouth, are pressed in a mass against the orifice of the sac and its circumference in the former, so that part of the force is lost. This may be partly remedied by grasping the tumour and drawing it outwards, so as to elongate it.

Adhesions may prevent the return of the protruded parts entirely or partially. Frequently the intestine is unadherent, and capable of replacement, the omentum adherent. If the connection be partial, and the uniting bands long, the parts may go up entirely or only to a certain extent; in the latter case, on pushing them further, they drag the sac and the integuments upwards, or the testicle in congenital cases. In this way the rupture may still pass up, and partial or complete* inversion of the sac be produced at the same time.

Complete† or partial‡ inversion of the sac, without any adhesions, has been met with on dissection, in crural or internal inguinal herniæ; the close connection between the sac and spermatic cord preventing such an occurrence in external inguinal

* MR. J. CLOQUET found, after death, “ the sac of an internal inguinal hernia returned into the abdomen, and resembling the finger of a glove, the apex, which had been the fundus of the sac, adhering to a portion of omentum, which seemed to have dragged it up.” Ibid. p. 102, note.

† Ibid. p. 104, pl. viii, fig. ii.

‡ Ibid. p. 106, pl. viii. fig. i.; p. 107, pl. viii, fig. iii; and p. 105, pl. viii, fig. vi.

ruptures. In the partial case, a portion of the sac has been pushed through the callous ring of its mouth: a looseness of adhesion between the rupture and the surrounding parts must be the principal circumstance favouring this inversion. MR. CLOQUET* has frequently produced it in the dead body, especially when the surrounding cellular substance was the seat of œdematous effusion.

If the viscera are tightly embraced by a thickened and indurated ring at the mouth of the sac, not adhering firmly to the tendinous aperture, if the sac itself is loosely connected to the surrounding parts, and its contents adhere to each other and to the sac, the rupture may be pushed back into the abdomen in a mass, sac and all together, and will form a tumour between the peritoneum and the abdominal parietes; this, which the French call *réduction en bloc*, seems to have been first noticed by LE DRAN †,

* Ibid. p. 105.

† Obs. 58. DE LA FAYE and ARNAUD confirm the statement of LE DRAN by their own experience. *Operations de Dionis*; Ed. v, p. 324, note a. *Tr. des Hernies*, tom. i, p. 96. The difficulty of accounting for this fact, when the universal adhesion of the sac to the surrounding parts is considered, and the still greater difficulty of allowing that a large tumour (for that of LE DRAN was a considerable one) could be thrust under the crural arch, led Mr. LOUIS to consider the whole affair as fabulous. *Mem. de l'Acad. de Chirurg.* tom. iv, p. 299. RICHTER has espoused the defence of LE DRAN with considerable warmth, both in a separate publication (*Programma, in quo demonstratur herniam incarceratam una cum sacco suo reponi per annulum abdominalem posse contra chirurgum Gallum clar. LOUIS*), and in his large work on Hernia (ch. xv).

who, in a case of femoral rupture, found on dissection the sac pushed into the abdomen with its contents, and still firmly including them. MR. J. CLOQUET* explains at some length the circumstances favourable to this occurrence, the mechanism, by which it is effected, and the arrangement of parts after it has taken place. He seems to have seen it rather frequently†, and he delineates the appearances, which he found after death, in a case where the sac alone had been reduced in this manner‡.

I have never seen a rupture reduced in a mass in the way just described: nor have I met with any preparation or specimen of such a reduction. Hence, as well as from considering all the circumstances of the case, I conclude it must be extremely rare. Its possibility will hardly have any influence on our practical proceedings.

* *Rech. sur les Causes et l'Anat. &c.* p. 112, et suiv.

† He says that he has accomplished this kind of reduction from twenty to twenty-five times in herniæ, strangulated or irreducible from other causes, or in empty hernial sacs. I apprehend that this observation applies to the dead body. According to MR. C. the *réduction en bloc* is easier in internal inguinal herniæ than in crural, and more difficult in external inguinal. He has never succeeded in umbilical hernia in the adult. Ibid. p. 114.

‡ Ibid. pl. viii, fig. iv.

SECTION II.

Construction and Use of Trusses.

Our object, in the application of a truss, is to close the openings through which the viscera protrude, by means of external pressure; and thereby, after the parts have been reduced, to prevent a second descent. The instruments employed for this purpose have been brought to great perfection in the course of the last century; and, when we consider the great number of ruptured persons, together with the essential relief which they derive from these bandages, we shall not fail to regard them as the most useful production of modern surgery.

A well contrived bandage should exert a sufficient and uniform pressure, without incommoding the patient, or being easily susceptible of derangement.

The different kinds of herniary bandages may be reduced to the two classes of elastic and non-elastic. The latter are composed of leather, fustian, dimity, or similar materials. These cannot be at all depended on, and should, therefore, be entirely banished from surgery. Since the size of the abdomen varies, according to the different states of the viscera, and to the motions of its parietes in respiration, a non-elastic bandage must vary constantly in

its degree of tightness, and keep up either too great or too little pressure. The omentum or intestine easily slips out when the opening is not exactly closed, and the patient who wears such a bandage must be in a state of constant insecurity. Those who lead an active life, or are obliged to use laborious exertions, will be more particularly exposed to risk. If the patient, after experiencing these defects, endeavours to remedy them by drawing the bandage tighter, he may confine the viscera, but he produces other inconveniences. The increased pressure injures the spermatic cord, and may affect the testicle: the integuments become red, painful, and excoriated; and the bandage must be entirely laid aside, until the parts have recovered. In Germany, where this kind is very much employed, RICHTER* has often seen painful tumefaction of the testicle, hydrocele, and even cirsocele, produced from this cause, and entirely dissipated by the employment of a proper truss. He also saw the pad of a non-elastic bandage excite, in the region of the abdominal ring, a considerable inflammation, which terminated after a few days in suppuration. The hernia never appeared again after the cure of the abscess. The inflammation had extended to the neck of the sac, and obliterated that part.

Elastic trusses, when well fitted, may be entirely depended on, as they keep up an uniform pressure

* *Traité des Hernies*, p. 24.

under every variation of circumstances. They yield when the abdomen is distended; and, in consequence of their elasticity, still remain closely applied when its volume diminishes.

The valuable properties of this instrument depend entirely on its spring, which keeps the pad constantly pressed against the herniary opening; and gives it a power of re-action, by which an uniform pressure is maintained under varying attitudes. This elasticity can be attained only by the employment of steel. In the first attempts at procuring something better than the non-elastic bandages, iron was used; and the instruments fabricated by BLEGNY at Paris were constructed of this metal. It is obviously inadequate to accomplish the ends which we have in view in treating herniæ; yet it is only at a comparatively recent period that its defects have been discovered. ARNAUD, whose writings contain much valuable information on this subject, recommends for the spring of a truss a mixture of malleable iron and steel; so that the instrument may be moulded by the hand to any particular shape which the patient may require; and he is followed in this point even by RICHTER. A truss, which admits of such management, must in effect be exposed more or less to the objections which apply to the non-elastic bandage; and the only material, which possesses the requisite qualities of firmness and elasticity, is well-tempered steel.

The most important part, then, of an elastic truss, consists of a flat and narrow piece of steel, adapted

to the form of the body, and called the *spring*. This passes round the affected side of the trunk, terminates anteriorly on an expanded plate of iron, to which it is rivetted, placed over the mouth of the sac, and extends behind to various distances beyond the spine*. The posterior surface of the plate is furnished with a convex cushion termed the *pad*, and adapted in form and size to the opening, which it is designed to close. The spring is covered externally with leather, and that it may sit easily on the body, its inner surface is lined with some soft substance†; a strong strap extending from its posterior end passes round the sound side of the trunk, and is fastened to a hook on the front of the plate. This strap, being perforated by several holes, enables the patient to tighten or loosen the truss at pleasure.

The curvature of the spring should be accommodated to the breadth of the haunch in each individual, for this varies very considerably. Where the curve is too small, the pad cannot sit with sufficient

* The spring of the truss has commonly been a semicircle, with the posterior end resting on the spine. CAMPER proposed to carry it round to the anterior superior spine of the sound side; and SCARPA very much approves the plan. Trusses of that form sit with a firmness, which cannot be given to the others by tightening the strap. They keep up the rupture much better than even a stronger spring of the other kind. M. i. § 32.

† This covering must be necessarily affected by the perspiration of the wearer; and where this is considerable it will injure the spring. Hare-skin, with the hair outwards, has been recommended as the best material in such cases.

firmness on the ring; and, in the contrary case, the body of the bandage cannot apply exactly, but must be liable to derangement. The posterior extremity of the half circle should have its internal surface directed a little downwards; while that of the front end and pad should be turned slightly upwards, to make it fit closely. In order that the pressure of the instrument should be equally distributed over the whole surface, on which it rests, it should bear equally at all points. Hence the obvious importance of having the spring carefully accommodated to the shape of the pelvis. The makers of trusses should be provided with casts of the human figure for this purpose.

A piece of cork is fastened to the posterior surface of the iron plate; and this is covered with leather, stuffed with hair or wool, so as to give it the due firmness, and to bring it to a slight and uniform convexity. When the pad is too soft, the pressure must be insufficient; and if it is too hard, the soft parts will suffer: hence those formed of wood are particularly injurious. A French author* has proposed a bladder filled with air as a substitute for hair or wool in the pad. I know not whether this proposal has been much tried. The bladder would probably soon become flaccid, and the materials already mentioned answer every purpose.

Various inconveniences arise from the common fault of making the pad too convex at its middle

* HERITZ, in the *Journal de Médecine*, tom. xxxvi.

part. The elevated centre pressing strongly, while the circumference has a very slight bearing, the parts may easily escape at the sides, particularly under a slight derangement, which is a very probable occurrence. Moreover, since the force of the spring must be exerted almost entirely on one spot of the pad, a moderate degree of pressure quickly becomes painful. If the pad be flattened, it applies equally throughout, and the action of the spring is distributed over its whole surface; it will not produce pain, even although the elasticity of the bandage be considerable.

A too convex pad may also be injurious, when accurately applied, by pressing the external soft parts into the opening; thus keeping them distended, and preventing that contraction on which a radical cure depends. Its partial and considerable pressure may separate the tendinous fibres near the ring, and thus facilitate a second protrusion. We must not, however, run into the opposite error of making the pad too flat: elevation in the circumference is not only useless, but actually injurious. Pressure on the spermatic cord would be a probable effect of such a construction.

When the pad possesses the proper figure, the surgeon must be careful to ascertain that it exerts an uniform pressure by the whole of its surface. The upper part sitting too closely allows the viscera to escape below; while an undue pressure at the lower part injures the spermatic vessels, and admits of protrusion above. When it rests flat on the opening,

and bears equally on all parts, the pressure is divided so as to cause no pain or inconvenience.

The size of the pad should be sufficient to cover the opening, and allow a few lines over in every direction.

A patient, who is ruptured on both sides of the body, must have a spring extending round the back and sides of the pelvis, and terminating anteriorly in two plates, each of which is furnished with a cushion for the hernia of its own side. A strap, sewed to one plate, and attached to a hook on the opposite side, serves to connect these together. A double truss is sometimes made with two distinct springs, but it does not possess the stability of the former kind. The distance between the two openings must be carefully marked in taking the measure for a double truss, and accurately observed by the maker in executing his instrument.

When in inguinal or crural ruptures the pad rises higher than its proper situation, the truss receives the addition of a thigh-strap, which passes from the back of the spring under the affected thigh, and is attached to the plate by means of a hook. The inconvenience arising from the opposite defect, in which the pad sinks too low, must be remedied by a band going over the shoulders: we may sometimes accomplish our object without making any addition to the truss, by merely changing the position of the hook to which the strap of the truss is fastened: when the pad rises too high, this hook should be placed towards the lower part of the plate,

and *vice versa*. A truss exactly adapted to the figure of the body will probably not need such additions.

The measure for a truss is taken by passing a string round the body, from the point at which the viscera are found to protrude, in that situation which it is intended that the instrument should occupy. In order to obtain a more exact representation of the form of the trunk, it is proposed to take the measure with a double flexible wire, which may be bent exactly to the form of the parts. In either case, the alteration, made by covering the spring, requires that an inch should be allowed beyond the measure*.

In order that a ruptured person may derive all the benefit which a truss can afford, and avoid, as much as possible, the inconveniences connected with its use, care should be taken that the spring be constructed of a due strength; that the instrument sit close in every part, so as not to make any partial

* The following Works may be consulted on the Construction of Trusses: —

DE LAUNAY, *Bandage Elastique pour les Hernies*; *Mém. de l'Acad. de Chir.* tom. i, p. 697.

CAMPER; *Mémoire sur la Construction des Bandages pour les Hernies*; *ibid.* tom. v, p. 626.

JUVILLE; *Traité des Bandages Herniaires*; dans lequel on trouve, independamment des bandages ordinaires, des machines propres à remédier aux chûtes de la matrice et du rectum, à servir de recipient dans le cas d'anús artificiel, d'incontinence d'urine, &c. With fourteen coloured plates. Paris, 1786, 8vo.

SALMON'S *Mechanical Analysis of Trusses, &c.* 8vo. London.

or irregular pressure; that it be not deranged by the necessary motions of the body; and that the form of the pad be adapted to the part on which it lies. When the measure has been properly taken, much must depend on the execution of the artist; yet attention on the part of the surgeon may often detect the source of inconvenience.

The strength of the pressure will be in proportion to the thickness and breadth of the spring. Small ruptures, and those which occur in children, or in persons who do not lead a laborious life, and are not obliged to make great exertions, may be retained by a weaker truss than is required for cases of the opposite description. As the omentum escapes from the abdomen much more readily than the intestines, an epiplocele requires a proportionally stronger spring than an intestinal rupture. When the hernia is large and old, or the subject of it is exposed to the necessity of frequent laborious exertions, a strong truss is required. The patient should on no account wear a more powerful spring than his rupture requires, since the long-continued pressure of the pad must have the effect of weakening and injuring the abdominal ring and surrounding parts.

When the case requires so strong a spring, that the pressure on the spermatic cord is painful, the pad may be constructed with a hollow, to admit this part. A similar contrivance may be found useful when rupture is combined with disease of the testis or spermatic cord.

In cases where an enlargement of the latter part has rendered it impossible to keep up ruptures by the common instruments, a pad, having a projection in its middle, just sufficient to fill up the opening, has been employed with success*.

The form of the spring, and consequently the position which it occupies at the side of the pelvis, is a point of the greatest importance in obviating the possibility of a derangement from the motions of the trunk or hip. Sometimes it is carried horizontally round from the pad; and then it goes so near to the trochanter major as to be very easily displaced by the motions of the thigh. To avoid this defect, it has been brought midway between the crista of the ilium and the trochanter; but the same inconvenience exists in a diminished degree.

Trusses are sometimes fabricated with a pad moveable on the spring, instead of being rivetted to it. This may be inclined upwards or downwards, according to the form of the abdomen; and it is retained at the desired point by a spring fitting into the teeth of a rack. In others the plate contains a screw, by which the cushion is pushed further inward, or allowed to recede at pleasure. A simple instrument, when well made, answers every end which can be accomplished by these more complicated ones, and is therefore preferable to them for reasons which must be obvious.

A compress of folded calico, placed under the

* Gooch's *Works*, vol. ii, p. 221.

pad, and renewed daily, preserves the truss from the effects of perspiration ; and certainly in many instances increases the beneficial operation of the instrument, although we cannot explain the principles on which this effect is produced.

If the unusual pressure should at first occasion redness and pain of the integuments, and even excoriation, the use of fuller's earth or powdered lapis calaminaris will remove these effects.

The pad of the truss should be placed over the opening at which the viscera have protruded : hence, in a small, or recently formed inguinal rupture, the proper position for it is considerably exterior to the pubes, and rather above that bone. The surgeon must, in all cases, endeavour to ascertain the precise point at which the rupture has taken place, and that is the right position for the pad. When he is going to apply the truss, he will place it round the pelvis, and put the patient into the recumbent position. Having carefully replaced the whole protrusion, he presses on the opening with one hand, and with the other applies the pad of the truss in its proper situation, holding it there until he has adjusted the rest of the instrument, and fastened the strap to the plate. The patient will follow the same plan in applying the instrument himself ; and the most convenient time for this purpose is before he rises, as the viscera generally re-enter the abdomen during night, and have no disposition to descend again until he assumes the erect position.

When the bandage is applied, the patient rises, and the surgeon examines it carefully in every point to see whether the skin is folded, pinched, or too much compressed in any situation. He may walk, cough, and make slight efforts, for the purpose of ascertaining whether the parts are well kept up; and if they are not, it must arise from some error in the construction or application of the bandage, which will require attention.

If the viscera are well supported by the instrument, the patient may follow his ordinary occupations: yet he should bear in mind the affected part. Violent exercise or bodily exertion, and excess of eating or drinking, should be avoided. The surgeon should examine him in two or three days. If any part has escaped, or if there be swelling or pain in the spermatic chord, some imperfection must exist in the instrument, and ought to be remedied. The omentum very often escapes, and great difficulty is frequently experienced in keeping it reduced. It may be necessary, if the pad retains its situation on the ring, and the truss in general sits well, to tighten the strap a little. Some individuals find the pressure of the truss extremely disagreeable at first, although it is no more than the case requires. These may wear a very weak instrument for an hour or two daily, increasing the length of time of each application, until habit shall have rendered its constant use supportable.

SECTION III.

Effects of the Truss; Return of the Sac: its Contraction, Obliteration, and closure by Adhesion.

WEARING an elastic truss not only keeps the viscera within the abdominal cavity, and thereby protects the ruptured person from all the dangers, to which the existence of his complaint would otherwise expose him; but, if continued for a sufficient length of time, even affords a prospect of a radical cure. The constant pressure of the pad keeps the neck of the sac empty, and thus favours the commencement and progress of those natural processes, which, after the replacement of the viscera, tend to prevent a recurrence of the complaint; *viz.* spontaneous reduction, or gradual contraction, with obliteration of its neck or body, and agglutination of its sides.

When no longer distended, the hernial sac may spontaneously return into the abdomen; the membrane which formed it is restored to its natural situation, and the peritoneal lining of the aperture regains its former appearance. The elasticity and contractility of the peritoneum, both in the sac and the neighbouring part of the abdominal parietes, coming into action when the distending force ceases to operate, produce this spontaneous reduction, which will occur the more readily, in proportion as the protrusion is more recent, but may take place, even where the sac has acquired a thickened and

firm mouth. In the latter case, the thickened ring is gradually decomposed and effaced, leaving, however, some whitish opaque lines, disposed in a circular form, and marking its former existence*. The firmer adhesion of the sac in general, and of its neck in particular to the surrounding parts, will prevent this kind of spontaneous restoration in older ruptures.

The neck of the sac, when kept empty, contracts, in obedience to the general law, by which all hollow parts of the body adapt themselves to their contents: the process is analogous to the closure of the membranous communication between the cavity of the peritoneum and that of the tunica vaginalis after the descent of the testicle.

The pressure of the truss may excite a slow inflammation and thickening, both of the empty sac, and of

* PETIT mentions this natural reduction of the sac in his *Tr. des Mal. Chir.* ii, 283.

Mr. J. CLOQUET has considered the subject at greater length; see his *Rech. sur les Causes et l'Anat. des Her. Abdom.* chap. vi, pl. viii, fig. ix.

He enumerates other modes of spontaneous reduction, which, like the foregoing, can only be ascertained by examination after death, and therefore have little or no influence on our practical proceedings. He has seen small inguinal and crural hernial sacs withdrawn into the abdomen by the enlargement of the bladder and uterus, and appearing as empty conical cavities at the side of those viscera. (*Ibid.* Obs. lxiii, lxiv, and lxv, Pl. ix, fig. iii.) The extension of the membrane in a new hernia may withdraw the sac of a former neighbouring rupture. (*Ibid.* Obs. lxvi, pl. vii, fig. iv and v.) Adherent omentum or intestine returned into the abdomen may draw the sac after it, and gradually bring it back.

the surrounding cellular substance, and thus assist and accelerate the contraction of the neck, and the separation of the sac from the peritoneum. I have met with an empty hernial sac, the neck of which was greatly contracted throughout, and entirely closed at one point. Mr. J. CLOQUET* minutely describes and illustrates by several cases and figures, the various stages of contraction and obliteration, the insulated serous cysts, which are found at the end of the process, and the white radiated marks or stigmata produced by the puckering of the mouth, and marking the place of former communication with the abdominal cavity. An obliteration of the cavity of the sac at its entrance, adhesions of the formerly protruded parts at the orifice, and a thickened state, both of the hernial sac and the surrounding cellular tissue, have been found by others, in the examination of individuals, in whom the use of the truss had effected a radical cure †.

The obliteration is sometimes accomplished in

* *Rech. sur les Causes et l'Anat. des Her. Abdom.* chap. vii.

† PARÉ found an adhesion of the omentum to the orifice of the sac in a patient radically cured by a truss. *Works*, book viii, ch. xvi.

ARNAUD mentions a case of epiplocele, which was cured in six or eight months. The mouth of the sac was obliterated, and the omentum, in a flattened form, adhered to it generally. *Mem. de Chir.* ii, 474. In another instance the neck was obliterated, and the fluid collected below. *Ibid.* i, 75. See also PETIT *Tr. des Mal. Chir.* ii, 285; and again at p. 377, where he thus expresses himself: “ J’ai trouvé qu’aux uns les parties s’étoient

another mode, by what Mr. CLOQUET calls atrophy of the sac. The membrane contracts and is thrown into folds. Its secreting surface loses its smooth polished appearance, and becomes dry: "the parietes of the sac, being in immediate contact, become adherent, without the formation of any false membrane. These adhesions either begin at various points, or at one only, and thence extend, without the possibility of detecting, by the most careful examination, the previous existence of inflammation, or the presence of inflammatory exsudation; they are accompanied by thinning and atrophy of the sac, which, on the contrary, is always thickened under inflammation and the deposition of coagulable lymph*."

I lately met with two very large and apparently old scrotal herniæ in the same subject. On one side the omentum was adherent, the mouth of the sac very large, and the abdominal ring greatly dilated. Here, of course, no truss could have been worn. The ring presented the same appearance externally on the opposite side; but the hernial sac

rendues adhérentes à la portion du péritoine, qui avoit autrefois formé le sac; qu'à d'autres, cette partie étoit devenue épaisse, et adhérente avec les anneaux des muscles, avec le cordon des vaisseaux, et à tout le voisinage; que le tout réuni ensemble formoit un rempart impenetrable aux parties du ventre." SCHMUCKER has often seen the mouth of the sac obliterated by adhesion. *Chirurgische Wahrnehmungen*, book ii, p. 241.

* J. CLOQUET, *Recherches Anat.* p. 55.

was empty, although its extent and the greatly enlarged state of the cremaster muscle covering it, with all other circumstances, indicated that it was an old, and had been a very large rupture. The mouth of the sac was closed by slight adhesions, and gathered into folds, and the cellular substance surrounding it greatly thickened. There can be no doubt that these appearances were caused by the pressure of a truss, which had thus nearly effected a radical cure in a very unpromising case.

As trusses, when skilfully employed, often excite, without pain, a slow inflammation, which terminates in the desirable object of obliterating the mouth of the peritoneal process, and thus effecting a radical cure; so, when placed with improper tightness, they have caused violent inflammation and suppuration, and exposed the life of the patient to the greatest risk*.

In proportion as the patient is younger, may we more reasonably expect a radical cure from the use of the truss. We may, indeed, speak with confidence on this point in the ruptures of children. Although cures sometimes take place in adults, they cannot be regarded as matters of frequent occurrence; and they are not at all to be expected in old subjects.

* SCHMUCKER; *Chir. Wahrnehm.* book ii, p. 340, 342. They were two omental herniæ; copious suppuration and mortification followed; but the patient recovered, after incurring great risk. A case related by Mr. WILMER terminated fatally from the same cause, Ed. ii, p. 84.

Some practitioners are inclined to prohibit the use of a steel truss in infants, but there is no foundation for this exception, and the instrument may be employed with perfect safety in the youngest persons. No benefit can be derived from the employment of a non-elastic bandage, which is sometimes used in infants; and we may lay down a general rule, that the chance of a permanent cure is greater, the sooner we begin to employ the steel truss. The resistance in these cases is but weak, and a strong spring is therefore unnecessary as well as injurious.

A small and recent hernia, which has been produced by some accidental exertion, affords the most favourable prospect of a radical cure from the application of a truss; which, on the contrary, offers nothing more than palliation in large and old ruptures, and those whose origin may be referred to predisposition. An epiplocele is less likely to be permanently cured, on account of the difficulty of keeping it constantly reduced.

The truss must be worn without intermission by a person, who hopes that its employment may cause such a contraction of the ring and sac, as will prevent any future descent of the viscera. The same rule should be observed by all, who are obliged to wear these instruments. It would be better indeed that no truss should ever be used, than for the patient, after wearing one for some time, to lay it aside suddenly; for a hernia reproduced under these cir-

cumstances is much exposed to the occurrence of strangulation, in consequence of the thickening and contraction which are going on at the neck of the sac; and such an incarceration is particularly dangerous. If, however, the parts should not be stricured, their protrusion dilates the sac and ring, which had begun to contract, and destroys the benefit already derived; the cure therefore commences again from this period. The inconvenience and restraint, occasioned by the first application of the instrument, induce us to allow the patient to sleep without it for a short time; enjoining him not to remove it before he has lain down in bed, and to re-apply it before he rises. This practice must be discontinued as soon as the patient's feelings will admit of it; and the constant wearing of the truss should then be strictly enforced. It may be said, that the posture of the body in bed is a sufficient protection against protrusion, and it is well known, that ruptures often recede spontaneously in the night. Yet a cough, or any exertion, may easily renew the descent, even in the recumbent position; and the patient who wears the instrument constantly is on the safe side. He ought to have at least two trusses, and will find it pleasant to change them in the morning. When the covering is much worn, or rendered irritating by the perspiration which it has imbibed, it should be immediately renewed.

When this plan of treatment has effected a radical cure, it may be discontinued; but, as the circumstances which indicate this occurrence are not clear,

prudence requires great caution in such a change. If the contraction of the sac, or the agglutination of its sides be not complete, and the parts yield to a fresh protrusion, the patient is thrown back to the point from which he set out. He may begin with leaving off the truss at night: let him afterwards place his hand on the opening, and then cough, hold his breath, or make slight efforts; if no tumour is occasioned, nor any preternatural impulse, the bandage may be left off at times during the day, all considerable exertions being carefully avoided. The longer he delays its entire abandonment, the greater is his security: and it is certainly better to continue wearing a truss beyond the period of actual necessity, than to leave it off too soon.

It must be allowed, after all, that trusses of the best construction, and most judicious application, will not always prove a certain defence against a protrusion. Various accidental circumstances may derange the instrument, and a portion of intestine, or more particularly of omentum, may slip out under the pad. For this reason, bodily exertion should be avoided as much as possible; and the patient, when obliged to make any considerable effort, should press on the pad with his hand. If a protrusion should occur, let him immediately take off the truss, lie down, and either return the part himself, or send for his surgical attendant.

CHAPTER VI.

THE RADICAL CURE OF RUPTURES.

It may be collected, from the contents of the preceding chapter, that, in the majority of ruptures, trusses can only be regarded as a means of confining the viscera within the abdomen, and thereby obviating the inconveniences which the unrestrained increase of the swelling would occasion, and removing a constant source of those dangers which attend incarceration. It has been there explained, that the complaint can be cured by these instruments, only under certain favourable circumstances; and that, even then, a considerable time must elapse before the desirable termination can be reasonably expected. In general, therefore, persons afflicted with ruptures must submit to wearing the truss constantly; and further, since this is not in all cases a perfect protection, they must also incur the risk, which indeed is very slight, of the complaint assuming a more formidable shape. These considerations have led to several attempts at an entire cure, which should include, not only a return of the protruded parts, but also a security against any fresh descent. The means designed to accomplish this object are called the *radical*, in opposition to the use of trusses,

or the *palliative* cure. As they are no longer practised, a detailed description of them will not be necessary; but their entire omission would have been hardly justifiable in a work professing to exhibit a view of the whole subject; more particularly as a statement of the question concerning the propriety of attempting a radical cure could not have been omitted.

The operations devised by the antients for the purpose of preventing the passage of the viscera into that production of peritoneum, which forms the hernial sac, were begun by a reduction of the parts, which were then retained by the hand of an assistant. A caustic was now applied to the skin, opposite to the ring, so as to form a small eschar. When this separated, if the sac were not sufficiently exposed, the application was renewed, until it was destroyed. The cure was then conducted by simple dressings, as in a common ulcer, and the cicatrix thus formed was expected to oppose the future descent of the abdominal viscera. Messrs. GAUTHIER* and MARGET are the last, who have employed this plan. Their caustic was sulphuric acid. The dangers of the treatment, and the insuperable objections to its adoption, are ably pointed out by MR. BORDENAVE†. Of three patients, who were made the

* *Diss. sur l'usage des Caustiques pour la guérison radicale des hernies*, 8vo. Paris, 1774.

† *Memoire sur le danger des Caustiques pour la cure radicale des hernies*, in the *Mem. de l'Acad. R. de chirurg.* tom. v, p. 651, and the Supplement, p. 881.

subjects of experiment at one of the hospitals in Paris, one died, one suffered a relapse, and a third escaped with a swelling of the spermatic cord. Perforation of the intestine, and fatal gangrene of the scrotum were other consequences of this method. Such wanton trifling with human life is of itself sufficient to excite our utmost indignation; even without the aggravating circumstance of learning, that the name of DE LA CONDAMINE is in the list of victims to this destructive quackery*.

Experience having shown that the protrusion often re-appeared after the use of caustic, the following was proposed as a more effectual proceeding. After exposing the hernial sac, it was elevated, in order to carry the actual cautery to the very bone, and produce an exfoliation. A more firm barrier against protrusion was now expected; as the cicatrix would adhere to the bone.

Other operators having passed a needle and ligature through the skin and under the sac, placed a piece of wood between the two ends, and then tied them. They drew the knot closer and closer, until the included parts had perished. As the spermatic cord was intercepted, and the testis consequently rendered useless, that organ was removed: but some professed to include the sac only. Others removed the testicle at once, and tied the sac.

Lastly, in order to save the testis, some operators, having laid bare and opened the hernial sac, sewed

* *Mémoire sur le danger des Caustiques pour la cure radicale des hernies*, p. 668.

it up with an uninterrupted suture. This method, having for its object to preserve the testis, and to maintain it in a state capable of fulfilling its function—that of giving subjects to the king—was styled the royal stitch.

The punctum aureum consisted in passing a gold wire under the spermatic cord and sac, and twisting it tight enough to close the latter, without injuring the former parts. A leaden thread, or a strong waxed ligature was employed in the same way.

The severe operations now described must have been attended with danger enough, if they had been performed by the most skilful surgeons; but they were generally practised by ignorant quacks and itinerant mountebanks, who, in moving about from place to place, after receiving their fee, left the patients to their fate. ARNAUD* saw a man die of hemorrhage in a few hours after a charlatan had publicly removed a large rupture and testicle. A travelling rupture curer, mentioned by DIONIS†, used to feed his dog with the testicles which he had removed. The animal was posted under the bed or table, waiting for the *bonne bouche*, while the spectators were made to believe that these precious organs were carefully preserved ‡.

* *Mémoires de Chir.* ii, 464.

† *Cours d'Operations*, p. 337.

‡ The author appears to consider, that this emasculating process is not objectionable in ecclesiastics, “*Les testicules sont des parties si nécessaires à l'homme, qu'on ne doit les ôter, que dans une nécessité très-pressante : c'est pourquoi on condamne*

That unprincipled men should be ready to sport with the lives of their fellow-creatures for a trifling gain, and that they should find others credulous and weak enough to entrust themselves in their hands, is not at all a matter of wonder. But we must be greatly surprised to see, that in modern times, the government of one of the most enlightened countries in Europe has allowed the itinerant rupture curers to practise their enormities unrestrained. By a report* presented to the Royal Society of Medicine in 1779, it appears, that the intendant of Police of Paris had observed, that many individuals, who came under his inspection, previously to entering the military service, had been deprived of one or both testicles, by operators of this description. The Bishop of St. Papoul found, that more than five hundred children had been castrated in his diocèse: and more than two hundred had been mutilated at Breslaw. We find too that castration was still occasionally practised when SABATIER published his treatise on the operations†.

ces sortes d'operations comme contraires aux loix divines et humaines: elles seroient cependant excusables sur un religieux qui préféreroit la guérison d'une hernie à ses testicules qui lui doivent être inutiles, et il en tireroit pour lors deux avantages; le premier c'est que ses organes ne le tourmenteroient plus; et le second, c'est qu'il seroit guéri d'une fâcheuse maladie." *Cours d'Operations*, p. 337.

* *Rapport sur les inconvéniens de l'opération de castration faite pour obtenir la guérison radicale des hernies, par POULLETIER DE LA SALLE, ANDRY, ET VICQ D'AZYR, in the Histoire de la Société Royale de Médecine*, tom. i, p. 289.

† 1796.

The celebrated Prussian surgeon, SCHMUCKER*, has described and practised a method of operating for the radical cure, which would be much less objectionable than any of the preceding processes. It consists in exposing the hernial sac by an incision through the scrotum; dissecting it carefully away from the integuments and spermatic vessels; opening it in order to push up the protruded parts; tying the neck as closely as possible to the abdominal ring, and then cutting off the remainder below the ligature. He practised this with success in two cases. DESAULT† cured a congenital bubonocoele at the Hotel Dieu, by placing a ligature on the mouth of the sac.

The risk which arises from exposing the cavity of the abdomen is incurred in this manner of operating; and the ligature on the neck of the sac must be regarded as a probable source of irritation. As a means of general employment in reducible scrotal ruptures, its merits rest on the same grounds as those of the other methods.

The object of the proceedings above described

* Experiments on the radical cure of old scrotal ruptures by the ligature of the sac, in *Chirurg. Wahrnehm.* book ii, p. 236, et seq.

LANGENBECK performs the same operation as SCHMUCKER, except that he does not open the sac. He has done it twelve times with the most perfect success; and the patients, of whom some lead laborious lives and use violent exertions, wear no truss. There is no return in a young man of sixteen operated on two years before. *Chir. Bibl.* ii, 729.

† *Recueil Périodique*, tom. ix, p. 290.

was to close the mouth of the sac, and thereby to prevent a future protrusion. We may add, that, if the end was attainable in this way, any of the measures would probably be sufficient. But, in truth, something more is required; we want a remedy that should contract the tendinous opening: for while that remains preternaturally large, a new protrusion is a highly probable occurrence. A cure might be expected in recent cases, which had arisen from violent exertion; or in young subjects; but in an old rupture, an old subject, or where the marks of predisposition are strong, there could be no hope. If the mere absence of an opening were sufficient to prevent hernia, the complaint would never occur; as the membrane is entire previous to protrusion. When the ring has been dilated by the descent of the viscera, we should be quite unreasonable in expecting the mere closing of the sac to form a sufficient obstacle to a fresh protrusion. The insufficiency of the methods is tacitly acknowledged by the recommendation of wearing a bandage for some time afterwards. We find, that the herniæ often appeared again in those who had undergone the operation*; and we know, that a renewal of the protrusion is so frequent after the ordinary operation for incarcerated hernia, that the use of a truss is universally adopted, as a means of prevention. Since then the cause of the complaint, the enlarged

* ACREL operated in several cases of reducible hernia; some were radically cured, while the complaint returned in others. *Chirurgische Händelser*, see *Lond. Med. Journal*, vol. iii. p. 13.

state of the tendinous opening, is not removed by the processes adopted for a radical cure ; since a recurrence of the disorder is not prevented, we may assert without hesitation, that these operations do not afford any greater chance of complete relief than the employment of the truss.

Here we come to a most important distinction between the two means. The latter is attended with no danger ; it causes at most only inconvenience, which diminishes daily, and soon entirely ceases : while the former is highly dangerous, and has proved fatal in many instances. The result of our experience on this subject is contrary to what many persons would have expected. An operation, not considerable in itself, performed on a perfectly healthy subject, would seem at first view to carry with it but little risk. Let it be remembered, that the cavity of the peritoneum is laid open, and that the consequences of such an exposure are hazardous under any circumstances. An appeal to experience will show, that the operation is at least as dangerous as that for strangulated hernia. ARNAUD* has recorded two cases of simple epiplocele, where the omentum could not be kept up, and the patients were thereby exposed to such inconvenience, as induced them to seek relief from the operation. They both died. SHARP† witnessed a similar termination in two or three patients who

* *Mem. de Chirurg.* ii, 453, 456.

† *Treatise on the Operations*, ed. x, p. 26.

were strong and healthy before the operation. ACREL* lost a patient in the same way.

The experience of PETIT is still more decisive on the same point. The very candid manner, in which he states the unfortunate termination of his operations, is so honourable to him, that the reader will be pleased to read it in his own words. The extract will convey an important lesson. "Nothing can justify us in operating on a hernia but the strangulated condition of its contents. The following observations have made too strong an impression on my mind, to admit of my advising, or practising this measure, as the ancients did, merely with the view of procuring a radical cure. I recollect, with feelings of painful regret, that I have twice operated under these circumstances, and have seen the same practice followed three times by my colleagues; without reckoning several narratives which others have given to me of their experience." The first operation was performed on a young man of twenty-five. No precaution likely to ensure success was neglected; and the subsequent treatment appears to have been, in every respect, judicious. The patient died on the sixth day; inflammation had spread over the whole peritoneum, and its marks were particularly conspicuous on the stomach, intestines, and omentum. In a woman of the age of forty, with an entero-epiplocele of the size of a fist, very alarming symptoms followed the operation, and life

* *Lond. Med. Journal*, iii, 13.

was despaired of on the fifth day. She, however, afterwards recovered. The third operation was performed in the presence of PETIT. Its execution, and the subsequent treatment, were conducted, according to his representation, with all possible skill. Here death took place on the tenth day, from peritoneal inflammation.

“I am not the only person who has observed, that operations on unincarcerated herniæ are not so favourable as those performed on incarcerated cases. Several of my brethren have made the same remark*.”

In two cases operated on by Mr. ABERNETHY, the patients were brought into extreme danger by subsequent peritoneal inflammation†.

The subject of an incarcerated rupture submits to the operation to save his life. But he, whose hernia is reducible, exposes his life to avoid an inconvenience; and the operation affords no greater prospect of entire recovery than he had without it. Indeed he cannot be considered as free from the danger of a relapse, without continuing to wear a truss. All these considerations apply with so much the greater force in the present day, since the improvements in the construction of trusses have diminished the inconveniences attending their use, and afford, not indeed a complete, but a very great, protection from the risks of ruptures. The surgeons of former times might find an excuse, in the imper-

* *Traité des Mal. Chirurg.* ii, 354 — 357.

† *Surgical Observations*, part ii, p. 5, et seq.

fection of their palliative means, for the hazardous measures by which they attempted a radical cure: and the serious evils arising from the unchecked increase of ruptures would naturally and reasonably lead the sufferers under such disorders to submit even to a hazardous mode of relief*. The prevalent belief, that these disorders are accompanied with a diminution of the sexual powers, would increase the desire of a radical cure, and provide, in an age when surgery was imperfectly cultivated, a constant source of imposition to the artifices of unprincipled persons.

RICHTER has hinted at the possibility of obtaining a radical cure in a short space of time, by the

* The following statement concerning the Swiss peasantry presents a lively picture of the sufferings produced by ruptures where the means of relief are imperfect. “*Sed miseri ob hunc affectum Helvetiorum ruricolæ considerandi nobis jam ulterius veniunt, qui herniis fidem fere humanam superantibus interdum premuntur: haud raro enim intestina vix non omnia in scrotum prolabantia adeo illud extendunt ut absque stupore ejusmodi hernia non possit aspici. Membrum sæpe virile fere totaliter absconditur, ita ut nonnisi foramen, per quod urina mittitur, de eo appareat; quandoque si in ejusmodi statu misero duris adhuc laboribus agitantur, facile τω miserere vel strangulationi intestinorum ansa subministratur. Adde quod etiam eo quo fruuntur victu excitentur tormina, arctæ insuper bracheriorum ligaturæ illos arceant a laboribus, sudor quoque a fortiori nisu et labore affluens subligaculum madefaciat, unde insignes molestiæ ortum trahunt. Per madefactum enim subligaculum et fortiorem motum cutis inter laborandum insigniter atteritur, et exinde producta vulnuscula tam urenti, et acuto dolore eos excruciant, ut semper operationi se subjicere, quam tantis doloribus obnoxii continuo vivere malint.*” *Freytag* in HALLERI, *Disp. Chir.* tom. iii, p. 70.

pressure of a tightly-applied truss. "Since inflamed parts contract adhesions when in contact, might we not," says he, "by means of the bandage, obtain in most cases a radical cure; employing it so as not only to compress the neck of the sac, but also to excite inflammation in the part? A truss with rather a hard pad should be employed for this purpose, drawn sufficiently tight to cause pain, and kept on until the pain is considerable, attention being paid to guard the spermatic cord. I think this would be the most easy and certain method of accomplishing a radical cure; and I have strong reasons for supposing that I have seen several individuals cured in this way." The immediate connection of the hernial sac with the cavity of the abdomen, the facility with which inflammation spreads over continuous membranous surfaces, and our entire inability to limit its progress to the desired spot, are very strong arguments against this proceeding. They expose the patient to a risk, which the desire of removing a mere inconvenience cannot justify*.

The proposal of DESAULT for the use of the ligature in umbilical hernia will be explained in the chapter on that subject: the propriety of operating on irreducible cases is considered in the next chapter; and the methods, which have been recommended to promote the radical cure, in the operation for incarcerated hernia, will be examined in the section on the operation.

* See the cases quoted in the preceding chapter, page 92, to show the danger of trusses which exert a strong pressure.

CHAPTER VII.

TREATMENT OF IRREDUCIBLE RUPTURES.

WHEN the urinary bladder is drawn out of its place into a rupture, it is not surrounded by a process of peritoneum, as the parts are in ordinary cases, but a portion of its surface is fixed by cellular connections in the new, as it was in the old situation; consequently the protrusion cannot be replaced. See the chapter on Hernia of the Bladder.

In an analogous manner, the cæcum and neighbouring part of the colon, and the sigmoid flexure of the intestine, sometimes descend through the abdominal ring, retaining their posterior and lateral cellular connections, and being therefore incapable of reduction. See the chapter on the Anatomy of Inguinal Ruptures, sect. vi; also chap. xi, sect. viii.

The reduction of a rupture may be impracticable, although the protruded parts suffer no strangulation. Increased volume of the hernial contents, preternatural connections of the parts to each other, or to the hernial sac, and membranous bands of adhesion crossing the cavity of the latter, are the causes which prevent reduction in these cases.

Thickening and enlargement of the mesentery and

omentum are the most frequent circumstances under the first of these heads. In irreducible ruptures of long standing, much of the mesentery gradually passes into the sac: this part, as well as the omentum, cannot increase greatly in the confined situation of the ring, but there is no obstacle to their augmentation below. The enlarged portion in the hernial sac is connected to the sound parts in the abdomen, by a comparatively thin process, and this conformation must be a great obstacle to reduction.

Adhesions of the parts proceed probably from the occasional irritation, which may be derived from pressure of the ring; and other accidental causes may assist, in a neglected rupture, in producing this effect. They assume various forms, and exist in very different degrees. Sometimes there are tolerably long and separate filaments; sometimes the parts are united into one mass by a close and general connection. The consistence of these adhesions is equally various. The protruded viscera may adhere to each other; to any part of the hernial sac; or to the testis, where they are contained in the tunica vaginalis.

Adhesions generally occur in old herniæ, which have been left to themselves, and seldom, if ever, returned. They may also exist in recent and small cases. The omentum contracts such connections very readily, and much more frequently than the intestines. Herniæ, which have been incarcerated, will very probably go into an adherent state in consequence of the inflammation which they have

experienced. In old and neglected ruptures we may expect adhesions as well as enlargement of the protruded viscera.

It is often difficult to determine whether adhesions are present, except from the obvious circumstance, that the tumour cannot be reduced. If the swelling can be replaced in part only, the existence of preternatural connections is probable; and it is still more strongly indicated, if the scrotum or the testicle be drawn up towards the ring, when attempts at replacement are made.

The most certain, and, indeed, the only method of avoiding the formation of adhesions, is the early reduction and exact retention of the prolapsed parts, by means of a truss. This kind of precaution is more important in an omental hernia, for the reason above stated.

In the sac of an irreducible hernia, where the passage into the abdomen must have been prevented by adhesions, water has been known to accumulate in such quantity as to cause pain, and other considerable symptoms, and to render an opening necessary for its evacuation*.

An irreducible hernia must be left in great measure to itself. Its bulk and gradual increase are sources of inconvenience, and the constant possibility of strangulation exposes the patient to considerable danger. The chance of incarceration is not, indeed, very great in these cases, since the ring is

* MONRO, *Edinburgh Medical Essays*, vol. v; SCHMUCKER, *Vermischte Schriften*, book ii, p. 55.

enlarged and weakened by its long distension, and the adhesion of the viscera, if it has occurred about the mouth of the sac, may prevent the introduction of a fresh part into the opening. Yet, experience proves that strangulation may occur, and that these swellings become gradually larger. For these reasons it has been proposed to open the sac, to destroy the adhesions, return the parts, and thereby produce a radical cure.

But, if this proceeding be not admissible in a case of reducible rupture, it is opposed by much stronger arguments under the circumstances we are now considering. The danger of the operation is much greater, as a very large surface is exposed, and the adherent parts separated by the knife in a long and difficult dissection, must also go through the processes of inflammation and suppuration. Let it be further considered, that the parts contained in a large and old hernia cannot always be kept up in the abdomen, from the diminished capacity of that cavity; examples of which are related in the present chapter, as well as in the section which treats of the operation on large herniæ. Lastly, the occurrence of strangulation is not probable; and, if it should appear, its progress is slow, and relief may be obtained by milder means: yet an objection must be made to the general rule of not operating in irreducible herniæ, in behalf of those instances, where the tumour occasions such essential inconvenience and suffering to the patient, as induce him, when the dangers he incurs have been fully represented,

to submit to the operation. Such was the case of the celebrated ZIMMERMANN*. The omentum adhered by a single filament to the testicle: when the former was replaced, the latter ascended with it, and experienced very painful pressure from the ring: if the parts were allowed to protrude again, a portion of intestine generally followed, was pressed on by the ring, and occasioned a fear of strangulation. The pressure of a truss occasioned such severe suffering that it could not be borne. In a patient, on whom MR. ABERNETHY† operated, an adherent epiplocele gave rise to frequent protrusions of the intestine, which were highly distressing. A particular source of danger and inconvenience existed in both these cases, and admitted of no remedy but the operation.

Surgical observers‡ have recorded several cases, in which large, old, and irreducible ruptures, in consequence of long confinement to bed, have returned completely into the cavity of the abdomen. It has been proposed to imitate this operation of nature by the efforts of art, and the attempt has, in some instances, been attended with success. By confining the patient to bed, by restricting him to a

* Related by MEKEL, *de morbo hernioso congenito, singulari*, &c. 8vo. Berol. 1772; and by SCHMUCKER, *Vermischte Schriften*, b. ii.

† *Surgical Observations*, part ii, p. 5.

‡ FAB. HILDANUS, cent. v, obs. liv; POTT's *Works*, vol. ii, p. 73.

light and sparing diet, and by the employment of venesection, calomel, purgatives, and clysters, ARNAUD* accomplished the replacement of a vast scrotal rupture, which had existed from infancy; and succeeded in numerous herniæ which resisted every other method. His assertions on this subject are corroborated by the testimony of LE DRAN†, who witnessed the progress of many of his cases. The same plan has been successful in several instances in the practice of MR. HEY‡.

By the employment of suspensory bandages progressively diminished, and the horizontal position, MR. J. CLOQUET§ accomplished the replacement of a scrotal hernia of the right side, as large as a child's head of three months, containing the cœcum and some small intestine. The treatment occupied two months.

This treatment induces a general state of weakness and relaxation, particularly favourable to the return of the protruded parts; it must also operate powerfully, by causing the absorption of accumulated fat, in reducing the bulk of the hernial contents. For the latter reason we should expect it to be particularly successful in such ruptures as consist, for the most part, of omentum; and the recorded

* ARNAUD on *Hernia*, p. 292; also his *Mém. de Chirurg.* tom. ii, p. 476, 486, 498.

† *Traité des Operations*, p. 114.

‡ *Practical Obs.* p. 219.

§ *Rech. sur les Causes et l'Anat.* &c. p. 112, note.

experience on this subject justifies our conclusion. In combination with the measures above described, considerable assistance may be derived from keeping up a constant pressure on the tumour, by means of a suspensory bandage, made to lace in front, and diminished in size, according as the contents of the swelling recede*. When the reduction of the tumour has been effected, it must be kept up by the application of a truss.

* When the size of the tumour is not very considerable, PETIT advises that its reduction should be attempted by means of trusses with hollow pads: and it appears from his representation, that these have been employed frequently in France with success. “Trusses designed for this purpose are not made with a common pad; but the latter part is excavated, and they are called ‘bandages à cuillière;’ in others, the part corresponding to the pad is a circle, triangle, or oval of thin steel: a piece of cloth covered with chamois, and more or less tense, is sewn to the inner border of this steel, and such are called ‘brayers en raquette.’ When instruments of these descriptions are used, they must be tightened from day to day, as the tumour diminishes, with great caution, the local effect, and the feelings of the patient being always regarded.

“It used to be stated as an axiom, that herniæ with adhesions could be reduced only by an operation: but since the management of hollow pads has been understood by surgeons, we have reduced and kept up several of these. Confinement to bed, and a strict regimen, are necessary parts of the plan.”

He says, that when the intestine has passed up, in a mixed case, the omentum, if irreducible, becomes accustomed to the pressure, is diminished in size, hardened, and consolidated with the sac, so as to prevent future protrusion. *Tr. des Mal. Chirurg.* tom. ii, p. 335, 346.

In some instances, where the parts have been returned, the ultimate success of the plan has been frustrated by an unexpected occurrence. The parietes of the abdomen have become so far adapted to the diminished quantity of the viscera, that the sudden introduction of a large additional bulk could not be borne. A patient, who persisted for a long time, under the direction of SCHMUCKER*, in keeping the parts reduced, was brought into a state of the greatest extremity, which absolutely compelled him to remove the truss. This gentleman has seen many instances of the same kind; PETIT has even known the practice to prove fatal: the application of the truss after reduction caused nausea and vomiting, and other distressing symptoms, which rendered its removal necessary, yet the hernia did not come down again, nor did the symptoms cease; and the patient died, as it appeared upon dissection, from inflammation of the peritoneum †.

In the case of an irreducible omental hernia of moderate size, a truss with a hollow pad may be recommended, but an enterocele will not bear this treatment.

Mr. COOPER has accomplished the reduction of

* *Chirurg. Wahrnehmungen*; vol. ii, p. 243. In two cases where ARNAUD had returned large herniæ, vehement colic compelled him to remove the bandage, and let out the parts. They were afterwards replaced more gradually. *Mém. de Chirurg.* tom. ii, p. 495.

† *Tr. des Mal. Chirurg.* tom. ii, p. 392, 393.

herniæ, in some instances, after the previous application of ice to the swelling.

A person, who has a hernia incapable of reduction, is exposed to much greater danger than the subject of a reducible rupture. Strangulation may take place at any time, in consequence of some straining or exertion; and complaints arising from affection of the intestinal canal make their appearance on the slightest exciting cause: hence it is particularly incumbent on patients so circumstanced, to avoid all unusual efforts; and, by a strict attention to diet and the state of the fecal discharge, to keep the alimentary canal, as nearly as possible, in a healthy condition. Costiveness should be particularly guarded against; by increasing the bulk of the contained parts, it increases the disposition to protrusion.

The use of a suspensory bandage will obviate some of the inconveniences arising from the swelling, by supporting its weight, and exerting a general pressure likely to prevent increase.

Large and irreducible herniæ seldom become strangulated. The obstruction, when it occurs, is generally of that species which arises from accumulation of the intestinal contents; and the proper treatment will consist in the employment of moderate external pressure, purgatives, and clysters. The conduct which should be followed, if these means are ineffectual, is pointed out in the section on the mode of operating on large herniæ."

Irreducible herniæ must of course be exposed to the consequences of external injury and vio-

lence ; hence, various cases are recorded, in which the bowels have been burst by blows*, falls†, &c.

* COOPER, part ii, pref. p. 2. Laceration of the intestine and mesentery, without any injury of the integuments.

A circular aperture in the ileum, with a ragged margin, of a size equal to the tube of a writing pen, caused by a violent blow on the pad of a truss. Fecal effusion into the abdomen, and death in forty-eight hours. MR. TRAVERS'S *Inquiry into the Process of Nature*, &c. p. 37.

† MR. COOPER, part ii, p. 47.

SCARPA has a case, in which a violent effort in turning the chain of a drawbridge, occasioned a hernia to be suddenly reproduced, which had been supposed cured for many years. The tumour was now very large and uniform. On opening it, gas and intestinal matters escaped. Four feet of ileum and a piece of colon were contained in the tunica vaginalis, and an opening of an inch in length was found in the latter, p. 310.

CHAPTER VIII.

TREATMENT OF STRANGULATED RUPTURES.

THE indication of cure in incarcerated hernia is to liberate the parts from stricture, and to replace them in their natural situation*. The treatment of the complaint, when examined in detail, will appear more complicated than this view of the subject would lead us to expect; for, as persons of every age and constitution, and of all ranks and conditions of life, are subject to the disorder, the means of accomplishing the general indication must be modified by these circumstances: hence we find, that various methods of treatment have been pro-

* The propriety of establishing this, and this only, as the indication of cure for strangulated hernia, is so striking and obvious, that it would have been almost unnecessary to notice it here, had not RICHTER and CALLISEN, two of the most celebrated modern surgeons, represented the matter in a different light. The objects of surgical treatment in this disorder, according to these writers, are, to obviate inflammation; to subdue spasm; to procure evacuations; and lastly, to replace the rupture: thus they combat the effect while the cause continues to operate. The last is the only rational indication, and its accomplishment necessarily includes the attainment of the other objects.—See RICHTER *Anfangsgründe der Wundarzneykunst*, vol. v, p. 238. CALLISEN *Systema Chirurgiæ Hodiernæ, pars posterior*, p. 464.

posed, which, though very different, and sometimes almost opposite to each other, may yet be all of them eligible in particular cases: their respective merits may in general be estimated by the degree in which they contribute to the accomplishment of the above-mentioned object.

In every instance of strangulation, the surgeon either can or cannot determine the cause and particular species of the disorder: in the former case his treatment will be guided by the knowledge he has of those circumstances; while, in the latter, he follows general rules, and employs, without any particular indication, those means of which experience has proved the efficacy. The last, or empirical method, is followed by most surgeons, who, in compliance with it, adopt measures which of course are often useful and proper, but which are also sometimes improper and injurious. That an attention to the cause and kind of the disorder is essentially necessary to a judicious and successful application of the curative means, must be obvious of itself: but frequently these points cannot be made out, and the surgeon perceives nothing more than the existence of the incarceration: here he must resort to the empirical treatment.

The principal means, which have been adopted for the cure of strangulated hernia, are bleeding; the warm bath; purgative medicines by the mouth, and in the form of clyster; injections of the decoction or smoke of tobacco; opiates and other antispasmodics; the cold bath, and various cold and

warm applications to the part. The works of surgical writers afford numerous instances, in which all these methods have been successful; and the practice of most individuals would furnish similar results. But the recital of single cases tends, as Mr. HEY has well observed, to advance our knowledge very little : our object should be to ascertain the comparative merits of each mode, and to deduce from thence general rules of practice. With this view I shall consider separately what is to be said on each of the above-mentioned methods.

SECTION I.

The Taxis.

It is a general, but ought not to be an invariable rule, to attempt reduction by the hand, when we first see a strangulated rupture. Inflammation, tension, and pain, either in the part, or in the abdomen, may make it advisable for us in the first instance to bleed, use the warm bath, or apply cold locally.

The mode of proceeding is sufficiently described in chap. v, sect. i. As we may expect greater difficulty than with ruptures not strangulated, it is more particularly necessary to attend minutely to all circumstances, especially those of position and attitude, that are capable of influencing the result.

The inflamed and very sensible state of the parts makes it necessary for us to proceed gently and

cautiously, to avoid forcible compression and rough handling, which not only aggravate the patient's sufferings, but, by increasing the inflammation, greatly augment his danger. Numerous instances are recorded, in which this unscientific roughness has produced the most injurious effects. Suppuration of the omentum*, and gangrene or rupture† of the intestine have been its more immediate or remote consequences: and the danger of the subsequent operation must be greatly increased if the attempts at reduction are ineffectual.

The probability of success will be greater in proportion to the size of the opening: hence small tumours are the most difficult of reduction, as they are always attended with the closest stricture; and this difficulty is experienced particularly in crural ruptures, from the small dimensions of the aperture through which their contents descend. The probability of replacement is also materially influenced by the duration of the complaint; it is much less in the later than in the earlier stages of the strangulation, from the inflammatory disorder which arises in the prolapsed parts.

* ARNAUD, *Mem. de Chir.* ii, 546.

† COOPER'S *Anatomy of Inguinal Hernia*, &c. p. 23; BELL, *System of Operative Surgery*, vol. i, pl. vii and xi; MORAND, *Opuscles de Chir.* tom. ii, p. 160; PETIT, *Tr. des Mal. Chir.* ii, p. 328. "Combien de fois," says the latter writer, "a-t-on vu périr des malades le même jour que la réduction leur a été faite? a l'ouverture des cadavres, on a trouvé, aux uns le boyau gangrené, aux autres il étoit crevé, et les matieres fécales répandues dans le ventre."

When the rupture becomes very painful, we are no longer justified in continuing attempts at reduction by the hand. A sufficient pressure cannot now be endured ; and the force, which is employed, only tends to increase the inflammation, and accelerate the approach of gangrene. At this period the operation is required, and should be performed without delay.

The surgeon is not warranted in relying on the taxis as his chief method of accomplishing reduction ; he should not waste in unavailing efforts of this kind, that time which ought to be devoted to the prosecution of more vigorous measures. When he cannot reduce a rupture at one fair trial, he has less and less chance of effecting this object in the subsequent progress of the case, unless he can produce an alteration in the state of the tumour by other means.

My opinion on this subject is confirmed by the experience of RICHTER, whose words I shall take the liberty of quoting.

“ Je n'ai vu que très rarement une hernie vraiment incarcerationnée être réduite par le taxis, et lorsqu'on a pu la réduire, les circonstances avoient été tellement améliorées par d'autres moyens, et les parties rentrèrent si facilement et si inopinément, quoiqu'on eut fait auparavant des tentatives en vain, que j'ai penché toujours à croire qu'elles seroient rentrées d'elles mêmes quelques heures plus tard*.”

* *Traité des Hernies, par ROUGEMONT, p. 66.*

Mr. HEY* also advises us to be cautious of doing too much, as he has seen great harm arise from long continued efforts to replace the strangulated intestine.

The opinion of RICHTER and of Mr. HEY receives the strongest confirmation from the experience and reasoning of DESAULT†. Long practice had shown that justly famous surgeon, that ruptures, in which the inflammatory symptoms are strongly marked, are seldom returned by the taxis, and that repeated and forcible attempts at reduction‡, employed before the operation, have a most decidedly unfavourable influence on the event of the case: hence he was led to proscribe the taxis in the inflammatory strangulation, until the previous use of other means had produced a change in the state of the swelling; and he justifies his conduct by the comparison of two lists of patients operated on at the Hotel Dieu: in one of these were

* *Practical Obs.* p. 144.

† *Œuvres Chirurgicales de DESAULT*, par BICHAT, tom. ii, p. 333—332.

‡ Those, who have seen much hospital practice, will recognize the justice of the following remark. “Il en des hernies étranglées comme de l'introduction des sondes dans les rétrécissemens de l'urètre; il faut, avant de recourir aux derniers moyens, que chacun se soit épuisé en secours préliminaires; il faut que l'effort de tous les consultants passe, pour ainsi dire, sur la tumeur: s'ils sont nombreux, est-il possible qu'elle ne soit pas meurtrie, déchirée, surtout si, comme il arrive, chacun cherche à l'envi à obtenir, à force de pressions ce à quoi n'a pu réussir celui qui l'a précédé?”—p. 336.

contained the names of patients, on whom reduction by the hand had been attempted, before the operation, in the usual manner; and, in the other, of those, who had been operated on without such attempts*.

The foregoing remarks are not intended to convey a general disapprobation of the use of the taxis. They are applicable to those cases only, in which the existence of considerable pain in the swelling and abdomen, together with other circumstances, denotes, that the incarceration is of the inflammatory kind. Where the rupture is tolerably free from pain and tension, and the general character of the case is slow and languid, a judicious use of the taxis can never be injurious. And, although it is undoubtedly true, that the first attempt is the most likely to be successful, and that the hope of reduction diminishes as the strangulation continues, it does not follow that other trials should be proscribed. They may be renewed, when the means employed to promote the return appear to have

* The remarks of PETIT on this subject coincide with those of DESAULT.

“ Il y a des gens qui veulent réussir, et qui se vantent même de les réduire toutes : malheureux les pauvres malades qui tombent entre leurs mains ; ils compriment trop l'intestin, la meurtrissure qu'ils y font, devient quelquefois mortelle par l'inflammation et la gangrene qui y surviennent. J'ai été plus d'une fois appelé en pareil cas, et j'ai fait avec répugnance des opérations aux malades sur qui l'on avoit fait de pareilles tentatives.” — *Tr. des Mal. Chir* tom. ii, 327, 328.

made any favourable change in the tumour, or in the general condition of the patient.

Mr. WILMER*, of Coventry, has suggested a plan, which should be noticed in this place. He proposes to make pressure by means of a weight left on the part for several hours. It succeeded with him in two cases. A two pound leaden weight was employed in one of these, and a common smoothing iron in the other. If the swelling were free from pain, and the circumstances not urgent, there could be no objection to a trial of this method.

SECTION II.

Treatment after Reduction.

THE patient is not to be considered as free from all danger, even when the rupture has been reduced. Generally, indeed, the symptoms are immediately relieved, and complete recovery speedily follows. But the cause of the strangulation may be of such a nature, that the reduction does not affect it; and its continued operation is indicated by other effects, although it no longer produces incarceration. The patient may suffer under symptoms produced by the strangulation; as, for instance, inflammation

* *Practical Obs. on Herniæ*, ed. ii, Case i and ii.

of the bowels, which may be apprehended particularly when the incarceration has lasted long, and has been violent. Or the complaint may have been inflammation of the parts in the hernia, and then the situation only of the affected organs is changed.

If the strangulation has been caused by any disorder of the bowels, the mere replacement of the prolapsed parts cannot be expected to restore the patient to health. Even under other circumstances, the existence of the obstruction is a source of irritation to the intestinal canal, which cannot with safety be overlooked by the surgeon. The symptoms will not entirely disappear, until evacuations per anum have occurred; and these in general do not take place spontaneously. The bowels are irritated and oppressed by the accumulation of their contents consequent on the obstruction. Hence mild purgatives, such as sulphate of magnesia in small doses, and clysters, should be ordered immediately after the reduction, and repeated at proper intervals, until the whole collection is cleared away*. This conduct will be more parti-

* RICHTER has been surprised at the prodigious quantity of alvine discharges, produced by the action of purgatives, after the reduction of a strangulated hernia; and he believes that a species of gastric fever follows violent strangulation. He has seen, under such circumstances, a true bilious fever, continuing for several days, and removed by the repeated employment of purgatives. He warns us against confounding a feverish affection of this kind with the effects of inflamed bowels; since bleeding, and the other means necessary in the latter case,

cularly necessary if the strangulation appears to have arisen from accumulation of the intestinal contents.

Where inflammation has been excited, previously to reduction, the effect will not cease, on the removal of its mechanical cause*. A continuation of the symptoms of strangulation, together with those which indicate inflammation in the abdomen, will then require bleeding, and the other antiphlogistic treatment, until these alarming appearances are removed.

It is possible that the rupture may not be completely reduced; a small portion of intestine may be still included in the stricture. If this keeps up the symptoms, and is irreducible, the operation becomes necessary.

A strangulation of the bowels, when returned, has been caused by preternatural adhesion, or uncommon conformations of the omentum. These occurrences are extremely rare, and cannot possibly be discovered during the patient's life.

The thickened and indurated neck of the hernial sac may keep up strangulation, when the rupture has been returned in a mass, as described at page 89. The case quoted from LE DRAN, at page 90, exemplifies this occurrence. Another

would only aggravate the evil in the former.—*Tr. des Her.* p. 68.

* Death has occurred from peritoneal inflammation, in a case where an inguinal hernia had been returned without any delay.—CAMPERI, *Icones Hern.* p. 3.

instance is mentioned by SCARPA* : “ I saw,” says he, “ this happen very lately in a boy thirteen years of age, in whom all the symptoms of incarcerated hernia continued, although it had been completely reduced, as far as could be judged from the sight and touch. And in fact, in the dead body of this boy there was not externally the smallest appearance of tumour in the inguinal region. But on opening the abdomen it was immediately discovered, that the intestine, still strangulated by the neck of the hernial sac, had been pushed up along with the sac beyond the ring, where it was seen rolled up between the aponeurotic parietes of the abdomen and the great sac of the peritoneum.”

The best course of proceeding, under such circumstances, would be that followed by SABATIER in a case which he has recorded in his *Médecine Opératoire*†. He had reduced an inguinal hernia, but the symptoms still continued. “ The ring was so large, that I could push two fingers into it from without, and thus was enabled to feel a roundish tumour, at considerable depth. I concluded that there must be internal strangulation, and that the only hope of saving the patient was by the operation, if I could succeed in bringing down the rupture again. I made the patient get up, and forcibly blow his nose, when the rupture reappeared, and I operated. The sac was thickened and contracted in the situation of the ring, and I divided it without

* English translation ; p. 143.

† Ed. ii, tom. ii, p. 342.

cutting the latter. The case was of the congenital kind, and the patient recovered."

If the strangulation should continue in a case of this kind, and the rupture could not be reprotruded by the patient's efforts, death must ensue, unless relief could be afforded by operation. If a swelling could be distinctly felt, either on thrusting the finger into the ring, or through the abdominal parietes in the inguinal region, would it not be justifiable to cut down on the part, to divide the aponeurosis of the external oblique, and ascertain whether the cause of stricture could be removed?

A very interesting case, in which the patient owed his recovery, under circumstances that would ordinarily have been deemed desperate, to the sagacity and judgment of Mr. DUPUYTREN, is related by Dr. BRESCHET*, and will serve to illustrate the preceding remarks. A crural hernia, which had existed in a reducible state for twenty-eight years, became strangulated, and the man was brought to the Hotel Dieu on the fourth day of the strangulation. In the bend of the thigh was a firm irregular tumour, as large as a hen's egg, extremely painful, and strongly bound down by the crural arch. In the course of the day the rupture went up suddenly, and with noise, but all the symptoms of strangulation continued, and the patient would not consent to an operation till the twelfth day. The anterior orifice of the crural canal having been exposed by a vertical

* *Considérations sur la Hernie Fem.* in his *CONCOURS*, &c. Obs. xx, p. 101.

incision, Mr. DUPUYTREN introduced his finger, and felt, at the depth of two inches behind the ring, a rounded elastic body, to which the patient referred as the seat of his sufferings. He pulled it by the cellular substance on its exterior surface, the patient at the same time coughing: thus a greyish white swelling, of irregular surface, was brought below the crural arch. A bloody fluid spirted out some inches when the sac was punctured, and the enlargement of the opening disclosed an intestinal convolution of reddish brown colour. The sac was now drawn down, so as to bring its neck on a level with the crural ring, and to enable the operator to divide the contracted circle, which had confined the parts. Stools passed in twenty minutes after the replacement of the bowel; and the recovery was rapid and complete.

Mr. DUPUYTREN pursued a similar conduct in two other cases; but, as each of these patients had two herniæ reduced, and could not distinguish on which side the pain was greatest, he was obliged to operate on both sides*. The particulars of these cases are not mentioned.

* *Considérations sur la Hernie Femorale*, in Dr. BRESCHET'S CONCOURS, &c. Obs. xx, p. 102.

SECTION III.

Blood-letting.

THE use of blood-letting in strangulated hernia has been very freely adopted, and warmly recommended by the most celebrated modern surgeons. The grounds of this practice are derived from the state of inflammation, which occurs sooner or later in the prolapsed parts, and which is propagated from that source over the whole abdomen. Besides its effects in curing and preventing inflammation, the state of faintness, which it produces, is said to be peculiarly favourable to reduction. Mr. POTT*, in this country, has been the most strenuous advocate of venesection, and the high estimation in which his writings are deservedly held has been a chief cause of its very general employment. RICHTER† and CALLISEN‡, the authors of the most approved continental systems of surgery, have been

* “ Perhaps there is no disease affecting the human body, in which bleeding is found more immediately and eminently serviceable than in this ; and which, therefore, if there are no particular circumstances in the constitution prohibiting it, ought never to be omitted ; but, on the contrary, should be freely and largely repeated, if it appears at all necessary.” — POTT’s *Works*, vol. ii, p. 79. SHARP’S advice on this subject is just the same. *Treatise on the Operations*, edit. x, p. 17.

† “ Aussitôt que la hernie est douloureuse, il faut saigner, de quelque espèce que soit l’étranglement.” RICHTER, *Traité des Hernies*, p. 93.

‡ “ Præcipuus vero cardo vertitur in sanguinis detractioe ;

no less forward in recommending the free and almost indiscriminate use of the lancet in this complaint. Yet the authority of these great names has not gained universal assent to their opinions. Some eminent surgeons of this country have not only doubted the utility of venesection in strangulated hernia, but have published opinions most decidedly adverse to the practice. Mr. WILMER* of Coventry, and Mr. ALANSON of Liverpool, consider bleeding as completely inefficacious in forwarding the reduction: the weight of Mr. COOPER's † experience has been added on the same side of the question.

The degree, in which any particular mode of treatment contributes to liberate the contents of a strangulated hernia from stricture, is the fair criterion by which its merits should be estimated. An examination of blood-letting, according to this rule, will not lead us to place that confidence in its

quæ non solum inflammationi obstat, et inde eo magis necessaria est, quo distinctiora phlogoseos symptomata adsunt, sed quoque ob citam, quam inducit, debilitatem, reductioni favet."—CALLISEN, *Syst. Chir. Hodiern. pars poster.*, section 707.

* See his *Practical Observations on Hernia, illustrated with Cases*, ed. ii. He says, on the employment of blood-letting in strangulated hernia, "I have seen it often tried, but never with any success."—p. 18. Mr. ALANSON, in a letter contained in the same work, expresses his opinion, "that bleeding is never of the smallest service in forwarding reduction."—*Ibid*, p. 29.

† *Anatomy, &c. of Inguinal Hernia*, p. 29.

powers, to which the strong recommendation of POTT, of RICHTER, and of CALLISEN would otherwise have entitled it. Venesection cannot enlarge the opening through which the hernial contents have descended; it cannot diminish the bulk of the prolapsed parts; nor has it the power of exciting any action of the viscera, which might extricate them from the stricture: yet, if it were found actually beneficial in practice, these theoretical objections might be justly disregarded; but it has gradually fallen into comparative disuse among the practitioners of this metropolis, from the experience of its frequent inefficacy. A means of such powerful operation as blood-letting, if useless, can hardly escape the suspicion of being injurious; and such, no doubt, it must be, when resorted to in all cases of strangulated hernia.

This observation applies to the indiscriminate employment of large and repeated bleedings. As patients, who die after the operation, have generally the appearance of inflammation in the abdominal contents, a judicious use of venesection, if it does not contribute to the return of the parts, cannot be injurious on the principles above-mentioned. The advocates and opponents of blood-letting have stated their opinions too strongly on the opposite sides of the question, and a prudent practitioner will take a middle course between these two extremes. He will not, with POTT, use venesection in all instances, neither will he follow Mr. WILMER in

discarding it entirely from the treatment of hernia, but will restrict its employment to a certain class of cases.

He will have recourse to it when the strangulation is of the inflammatory kind; when the hernia is small and recent; the abdomen tense and painful; and the patient young, strong, and plethoric. Two cases are related in the excellent Practical Observations of Mr. HEY*, which will serve to show under what circumstances venesection is allowable. The experience of this judicious practitioner leads him to concur with Messrs. WILMER and ALANSON in declaring, that blood-letting has generally failed to procure the return of a strangulated intestine, although he does not agree with them in their universal reprobation of its employment.

Although venesection should prove inadequate to the intended object, other advantages are derived from it; *viz.* that, by checking inflammation, it keeps the disorder stationary, and is therefore attended with no loss of time; and, for the same reason, it promotes the success of the operation, should that be afterwards required.

It is hardly necessary to observe, that the conduct of the surgeon cannot be regulated in these cases by the state of the pulse; the pain and tension, and other symptoms, will justify him in employing or repeating this evacuation, where the pulse

* Page 124.

is weak, and not beyond its natural frequency. Neither should he be deterred from using the lancet by coldness of the extremities, pale countenance, and weak respiration: since these are ordinary symptoms of inflamed bowels: and the experienced surgeon knows, that venesection will raise the pulse, restore warmth to the limbs, and apparently strengthen the patient.

The blood should be drawn rapidly from a large orifice, and in considerable quantity, so as to produce fainting, under which we may attempt reduction with great advantage. A small bleeding can do no good, even if repeated. In the choice and mode of employing this remedy, we shall be regulated by the age, strength, and general condition of the patient, and by the species of strangulation. The course just described will be proper in the young, strong, and plethoric; in all cases where fulness of habit may favour the occurrence of inflammation, and more particularly where symptoms of inflammation may be already present.

SECTION IV.

The Warm Bath.

THE warm bath is used with views partly analogous to those, which guide the practitioner in the employment of venesection: it induces a state of faintness and relaxation, under which reduction may

be attempted with advantage. The weakness produced by this remedy is temporary, and is not attended with any subsequent debility. The use of opium may be advantageously combined with it, if the symptoms of irritation are strong. After the taxis has been unsuccessfully employed, the patient should be placed in the warm bath, if possible, in the recumbent position: when faintness comes on, the attempts at reduction may be renewed in the bath.

The warm bath may be used in the early stages of the complaint, when the symptoms are not yet very urgent. If the strangulation has lasted for some time, so that the circumstances require dispatch; if it has resisted more powerful means, such as the topical application of cold and the tobacco clyster, it would be mere waste of time to employ this remedy; when indeed the strangulation is completely formed, the warm bath offers but a slight chance of producing the return of the parts.

SECTION V.

Purgatives.

PURGATIVE medicines have been recommended with the view of exciting the peristaltic action of the intestine, and thereby extricating it from the stricture. Experience has taught us to repose very

little confidence in these remedies: they are not only inefficacious, but actually prejudicial in the inflammatory strangulation. They are either immediately rejected on reaching the stomach; or, if they pass into the intestines, increase the irritation under which the parts already labour. Hence the most approved surgical writers* of the present day prohibit their employment in cases of that description. In large and old herniæ, where an accumulation of fecal matter, from torpor of the intestine, is the cause of strangulation, and the symptoms are of the chronic kind, purgatives may be employed with success; and those of an active description, such as jalap, or the compound extract of colocynth, combined with calomel, are the best: the ordinary combination of Epsom salts and manna, with infusion of senna, is also well suited to such cases.

If vomiting has already appeared, it may be allayed by opium and the effervescing draught, so as to allow a fair trial of the purgative. The most violent remedies of this description are not always the best in such a case. Epsom salt, dissolved in a large quantity of water, and exhibited in small and repeated doses, does not offend the stomach, gently excites the action of the bowels, and is preferable to the more drastic purges. Opium may be combined with this remedy, to make it sit better on the sto-

* POTT's *Works*, vol. ii, p. 82; RICHTER, *Traité des Hernies*, p. 89; HEY's *Practical Obs.* p. 128; WILMER, *Practical Obs.* p. 36.

mach. RICHTER* commends the combined employment of purgatives and opium, and praises highly from his own experience, the following formula. Melt an ounce of Epsom salt in five ounces of infusion of camomile flowers; add two ounces of linseed oil, one ounce of lemon juice, one ounce of the syrup of red poppies, and two grains of purified opium: shake them well together, and give a spoonful every quarter of an hour, until it operates.

Purgatives are no longer serviceable when inflammation has come on, even in those cases, where their employment was proper in the first instance.

An omental hernia is another exception to the general doctrine on the subject of purgatives. If we can clear the intestines completely, the operation will seldom be necessary: bleeding, the warm bath, and fomentations to the abdomen may be usefully combined in this case, with such means as will evacuate the bowels. As the tendency to sickness may render it advisable, in such a case, to exhibit the purgative in the form of pills, the union of calomel and the cathartic extract† is well adapted for

* *Traité des Hernies*, p. 82.

† Dr. HEBERDEN considers the cathartic extract and vitriolated magnesia to be the best purgatives in cases of ileus. He directs half a dram of the former to be made into five pills, with the addition of a grain or a grain and a half of opium: these are to be taken one at a time. If the vitriolated magnesia be employed, a dram of it should be dissolved in an ounce of water, weak broth, or gruel, and taken every half hour. *Medical Transactions*, vol. ii, p. 516.

the purpose: for the same reason, a combination of opium with these medicines may be serviceable.

Purgatives, in the form of clysters, do not seem more efficacious than the same remedies taken by the mouth: if the intestine below the stricture has not been already emptied (which, however, it generally is, soon after the strangulation is formed) clysters will bring away its contents. Their exhibition in this form is not liable to the same objection, which renders it improper to administer them by the mouth; *viz.* the increased irritation which they occasion. In cases, where purgatives are proper, clysters may be combined with them.

SECTION VI.

Tobacco Clyster.

CLYSTERS of tobacco constitute our most powerful and certain means of relieving incarcerated hernia, independently of the operation; and general experience has so clearly shown their efficacy, that the knife is rarely, if ever, resorted to in the present day, without a previous trial of this remedy. Yet it is not invariably successful. We can by no means assent to the observation of HEISTER*, that the use of tobacco renders the operation in all cases

* “ Posteaque aliquot ejusmodi ægros hoc fumo tabaci feliciter restitui ut nunquam adhuc hoc in morbo ad scalpellum accedere opus mihi fuerit.” *Institut. Chirurg.* p. 807.

unnecessary. It may be employed in the form of infusion, or of smoke: in the former case, one dram* of the herb having been boiled for ten minutes in a pint of water, the strained liquor should be injected. The smoke is impelled into the rectum from the well-known apparatus, consisting of a bellows, long pipe, &c. The effects on the patient appear to be nearly the same in both instances, and our present experience does not warrant us in ascribing a preference to either form of the remedy†.

The beneficial effects of tobacco do not depend on its purgative power, as I have already stated that purging clysters are nearly inefficacious. It not only excites the action of the intestines, but ex-

* One dram of tobacco, boiled or infused in a pint of water, is the quantity generally recommended by English practitioners. — POTT's *Works* vol. iii, p. 276; HEY's *Practical Obs.* p. 140; COOPER's *Anat. &c. of Ing. Hern.* p. 24; HEBERDEN's *Commentaries*, p. 270. And this is generally found sufficient to produce the desired effect. The cases quoted below should render us cautious in exceeding this proportion: RICHTER, however, orders an ounce of tobacco to the same quantity of water. — *Anfangsgründe der Wundarzneykunst*, vol. v, p. 264. Can this difference be accounted for by the habit of smoking, which is universally prevalent in Germany?

† Mr. HEY prefers the decoction, without mentioning the grounds of his preference, p. 140. POTT and RICHTER seem to think the smoke preferable. The former states, that the smoke does not operate so powerfully on the nervous system as the decoction. The administration of the smoke is often attended with considerable trouble and inconvenience, so that the decoction has grown into more general use: and it is the most certain way of employing the remedy. Yet the smoke may be used to a greater extent, without fear of the consequences, than the decoction.

erts a peculiar depressing influence on the system at large; it reduces the pulse, and brings on nausea and sickness, cold sweats and fainting, under which circumstances the parts recede spontaneously, or may be returned by the slightest pressure. Its use should be continued until these effects are produced: the quantity required for that purpose varies considerably in different persons. Mr. COOPER has seen two drams, and even one dram, employed in the form of infusion, prove fatal to the patient*. In other instances, two ounces have been consumed in the smoke apparatus before the necessary effect was produced, and such cases have terminated favourably †. I have seen two drams used in decoction, and two thirds of an ounce entirely consumed in smoke in the same patient, who was fifty years of age, with the production of very slight effect: I afterwards operated on this patient with complete success.

The tobacco has sometimes been successful in the extremest cases; a rupture was reduced by this re-

* *Anatomy, &c. of Ing. Hernia*, p. 24. The smoke was fatal in a case observed by DESAULT; *Œuvres*, ii, p. 344.

A fatal case is recorded in the *Edinb. Med. & Surg. Journal*, vol. ix, p. 159. "Some years ago I was desired to visit a young man, who was seriously indisposed with the most violent symptoms of colic, for which he had taken a variety of purgative medicines to no purpose. I suggested a clyster of infusion of tobacco, in the proportion of two drachms to eight ounces of boiling water. No sooner was it administered, than he was seized with something like convulsions, became speechless, and died in an hour or two." The body was not inspected.

† *POTT's Works*, vol. iii, p. 227.

medy under Mr. POTT's * direction, when every other means had failed, and the patient had been placed on the table for the operation. Similar instances of its efficacy are related by the same author. I think it worth while to add to the testimony already before the public, the following proofs of its great powers; previously observing, that I do this merely to show what the remedy is capable of effecting, and not for the purpose of exhibiting models of the conduct, which a surgeon should pursue in such instances.

CASE I.

All the usual means had been employed ineffectually, in a strangulated scrotal rupture, for the space of five days. The tobacco smoke was resorted to; and, after persevering in its use for a considerable time, the tumour subsided spontaneously.

CASE II.

In another case, where the strangulation had lasted for a week, and the feeble pulse, fecal vomiting, pallid countenance, and oppressed breathing indicated the greatest danger, the tobacco produced its beneficial effect, and the patient recovered.

* POTT's *Works*, vol. iii, p. 227.

CASE III.

In one instance, where the smoke was ultimately successful, its effect on the system at first was nearly fatal. The strangulation had existed for three days, in which time purgatives and clysters, large bleedings, and cold applications had been ineffectually employed. The administration of the tobacco produced such a state of tremor and faintness as to make the attendants think the patient was dying. The pulse sunk so as to be scarcely perceptible; and the countenance bore marks of approaching dissolution; under these circumstances the stricture gave way, the parts returned, and the nervous system soon recovered from the effects of the remedy.

In conclusion it may be stated, that the tobacco, like every other means, has often failed; but that no other remedy has been so frequently successful: and that, when this has appeared, on a fair trial, to be incapable of accomplishing our object, the only resource lies in an immediate performance of the operation.

SECTION VII.*Antispasmodics.*

THE utility of antispasmodics in strangulated hernia is much insisted on by RICHTER*: he in-

* *Anfangsgründe der Wundarzneykunst*, vol. v, section 322 — 329.

cludes under this denomination the warm bath, emollient fomentations to the abdomen, opium, ipecacuanha in small doses, &c. Opium, indeed, has been often recommended, and many cases might be collected, where it should seem to have promoted the return of the prolapsed parts; but general experience does not warrant any great reliance on this remedy. It possesses, according to Mr. HEY's * observations, the power of suspending the pain and vomiting, even where it proves ultimately inefficacious. It may therefore be an useful auxiliary, under certain circumstances, although it cannot be considered as a primary means of accomplishing our object.

Dr. HEBERDEN † speaks very highly of the use of opiates, in cases of ileus, from his own experience. The advantages which he has seen derived from such remedies are, that they enable the stomach to bear stronger and more repeated doses of purgatives, obviate the want of sleep, and suspend the distressing anxiety and restlessness. Even if the case should be desperate, they will alleviate the sufferings of the patient, and tranquillize the last moments of that existence which they cannot prolong.

On the use of ipecacuanha, and other antispasmodics, my own experience does not enable me to decide. I should not expect any benefit from their employment. When I am informed that the return

* *Practical Observations*, p. 134, and *Case*, p. 129.

† *Commentaries*, p. 272.

of a hernia has been effected by means apparently so inadequate as the exhibition of two grains of opium and castoreum*, I cannot help suspecting that reduction might have been accomplished without the aid of these medicines. Not content with employing ipecacuanha in nauseating doses, RICHTER actually speaks of giving it in such quantity as to occasion vomiting. I am exceedingly surprised to meet with such a proposal from a person of RICHTER's good sense and great experience. Surely, if vomiting is to effect the return of a strangulated hernia, we may leave the case to nature: this symptom appears speedily enough without the use of emetics.

SECTION VIII.

Cold Bath, and cold Applications.

THE cold bath, and the dashing of cold water on the patient, although, perhaps, successful in a few cases †, have never produced very decided benefit,

* RICHTER, *Traité des Hernies*, p. 52.

† PETIT mentions a case, in which, after the regular and unsuccessful employment of the usual means of art, he had resolved on the operation, and was on the point of making his first incision, when he was stopped by the arrival of the patient's grandmother, who commanded him to desist. She had the patient placed on a blanket, and ordered a bucket of cold well water to be dashed on the thighs and abdomen; and the hernia returned almost immediately. — *Tr. des Mal. Chir.* tom. ii, p. 325.

nor been attended by such general good effect as to warrant their recommendation.

The application of cold to the hernia is entitled to more attention*. This may be accomplished by pounded ice, tied up in a bladder, and placed on the rupture. A solution of sal ammoniac, or of other salts, in cold water, may be employed in the same manner. The application of folded cloths dipped in iced water, and frequently renewed; and the evaporation of ether† upon the part, are other means of accomplishing the same object. We should persist in the trial for some hours, in order to give it a fair chance: yet caution must be observed on this point; for the scrotum has been frozen by the long continued use of ice‡. If no benefit is derived in the course of four hours, we need not expect success from the further prosecution of this treatment.

The topical application of cold is one of our most powerful means of treating strangulated hernia, and is to be considered as second only to the tobacco. We cannot explain very satisfactorily the exact manner in which this remedy operates. It is sup-

* Mr. WILMER has been very strenuous in recommending this practice, and has related several cases of its successful employment.—See the second edition of his Tract, London, 8vo. 1802.

† Instances of the efficacy of this treatment are related in *Duncan's Commentaries*, vol. xvii, p. 487; and vol. xviii, p. 448. See also SCHMALZ in LODER *Journal für Chirurgie*, book i, p. 681.

‡ COOPER, part i, p. 25.

posed, by causing a constriction or corrugation of the integuments and external parts, to create a general pressure on the surface of the prolapsed viscera. At the same time, by diminishing the inflammatory disorder, it will reduce the bulk of the parts, and these two effects concur in promoting the reduction. As the sensibility of the swelling is lessened by the operation of cold, the parts may afterwards be handled with less pain. It may be combined with the use of the tobacco.

SECTION IX.

Warm Applications.

POULTICES and fomentations, both to the swelling and abdomen, were formerly very generally employed in the treatment of strangulated hernia; but repeated experience has so fully demonstrated their inefficacy, that no practitioner of the present day would place the least confidence in them. The constant progression of these cases from bad to worse renders it necessary that effectual means should be resorted to in an early stage of the complaint: hence any mode of treatment, which in itself may be harmless, becomes, from the loss of time which it occasions, positively prejudicial.

In inflammatory strangulation, with tension and pain in the swelling and abdomen, fomentations and poultices might give some ease; and with this

view they might be employed when it could be done without omitting or delaying more effectual measures.

SECTION X.

General Observations.

It is hardly necessary to observe, that a patient, who has a rupture, which cannot be replaced, ought immediately to go to bed, to place himself in an attitude the most favourable to the return of the parts, and to abstain from eating and drinking.

If the practitioner be called in the early state of the complaint, and the taxis have been unsuccessful, blood-letting and warm bathing will be the first means for him to employ. I should not, however, recommend the warm bath, unless it can be prepared expeditiously. Cold applications to the tumour hold the next rank in the list of remedies. Should these be unsuccessful, he will give a fair trial, with as little delay as possible, to the tobacco; and, in the event of its failure, immediately operate.

A surgeon, whose opinion, from his vast experience, and disinterested zeal for the improvement of his profession, is entitled to our greatest attention, has questioned the propriety of commencing operations in all cases of strangulated hernia, by attempts at manual reduction. “If,” says DESAULT*, “the

* *Œuvres Chirurg.* tom. ii, sect. iv.

strangulation is slight, the warm bath, with a proper position of the body, and emollient applications will bring about the return of the intestines by their relaxing effects. Some cases might, no doubt, be more promptly relieved by the taxis; but we must place against these all the instances in which our efforts, by increasing inflammation and swelling, are not only useless but injurious. Should the strangulation be more considerable, and require a proportionally greater force, the danger will be augmented in the same ratio. The failure of these exertions leaves the operation as the last resource; but do not expect it to be successful: the injury already done to the parts is an alarming source of danger." On this circumstance DESAULT always founded his prognostic, which was generally correct. "Think favourably", said he, "of a hernia which has not been handled before the operation." A rule should, therefore, be established, in conformity with these principles, to abstain from the taxis at the beginning of strangulation, and to employ relaxants. When these have produced an alteration in the tumour, gentle attempts at reduction will complete the business. The treatment of strangulated herniæ was conducted at the Hotel Dieu, in compliance with these notions. The patient was placed in the warm bath, immediately on his arrival, with his trunk in the same position as is employed for promoting the return of the parts in the taxis. He was left there as long as he could bear it; perhaps for one or two hours. An emollient ca-

-taplasm was afterwards placed on the tumour, and clysters were injected. The bath was used three times in the day. When the inflammatory symptoms were considerable, venesection was combined with this treatment.

These remarks are particularly applicable to the inflammatory strangulation: although they do not precisely accord with the usual practice of this country, it will probably be allowed, that they are not entirely unsupported by reason; and they are deduced, according to the representation of BRICHAT, from the result of all DESAULT's experience. They who are not disposed to adopt, in their full extent, the opinion and practice of the French surgeon will probably coincide with him so far as to allow, that the infliction of considerable violence on organs, which, by their construction, are prone to inflammatory action, and, in their natural situation, are completely protected from external injury, may be injurious; that such treatment is more likely to be hurtful, when these organs are actually inflamed: and, at all events, that the rude handling of a rupture by five or six persons in succession can do no good, but may possibly be very mischievous.

The employment of venesection, clysters, and purgatives, if the stomach will bear the last-mentioned remedies, will generally relieve the distressing symptoms of an epiplocele, and preclude the necessity of having recourse to the operation. The

application of leeches to the tumour affords a prospect of benefit in this case.

When, as it very frequently happens, the aid of the surgeon is not required until the complaint has lasted for some time, a trial of the tobacco, together with the topical use of cold, should be immediately resorted to; as circumstances will not admit of delay in the previous use of less powerful remedies. He should observe the cause and character of the incarceration, and exert his judgment in the selection of his means, and their adaptation to the circumstances of the complaint.

In a case of inflammatory strangulation, let the patient be bled to syncope, and reduction attempted during the fainting. If it does not succeed, he may be put in the warm bath for an hour or two; and the taxis may then be repeated. A warm poultice may now be placed on the tumour, the bleeding repeated, and a purgative clyster injected. If these measures, used in quick succession, should fail, let the operation be resorted to without delay.

In a strangulation from accumulation of fecal matter, we may begin by attempting reduction, and employ some time in such attempts, diversifying them, to take every chance of success. In a young, and strong patient, a pretty free bleeding may be tried if the taxis should not succeed. Cold may be applied to the tumour. A brisk purgative of calomel and jalap may be administered, and followed by the sulphate of magnesia, in doses of one or two

drams, every two or three hours, in some distilled water, or with infusion of senna. Clysters containing the latter medicine should also be administered. In the failure of these means, we may proceed to the tobacco clyster, which is well suited to such cases. Although the early performance of the operation is not so important as in the preceding case, and it is often had recourse to successfully after a lapse of three, four, or more days, it will be best for the patient to undergo it as soon as the means just enumerated have been fairly tried and found unavailing.

I wish to impress the surgeon with the propriety of giving, without delay, an adequate trial to means of real efficacy, and of performing the operation as soon as it can be clearly perceived that these are unsuccessful*. There is no reason to expect that a less

* “In universum notandum, remedia incarcerationi opitulantia, cito et strenuè adhibenda esse, cum natura hic parum aut nihil faciat, et omnis ægroti salus ab artis auxiliis petenda sit: omnis mora, omnisque tardior aut negligentior remedium usus, semper damnosus, sæpissime exitialis erit.” — *CALLISEN, pars poster. p. 464.*

This argument has been so clearly and forcibly stated by *RICHTER*, that the reader will not be displeased at my inserting the following extract from a paper of his in the *Göttingen Commentaries*:—“Quando mitiora remedia sedulo et dextere, ast incassum adhibita sunt, differenda non amplius est operatio. Quid enim spei superest, ut quod primo die non præstiterint, id præstent postero? Increscit omni momento vehementia morbi, increscit vis illa, quæ constringit partes prolapsas, increscit difficultas medelæ, ut itaque, quæ initio morbi, ubi facilius curatus morbus erat, nil profuerunt remedia, certe sub progressu morbi jam curatus difficilioris nil proderunt; superest hic ope-

active remedy will succeed, when a more powerful one has failed. The chance of reducing a rupture is lessened in proportion to the duration of the complaint: the prolapsed parts becoming more inflamed, are more closely pressed by the stricture, and soon fall into a state, where attempts at reduction by the hand are inadmissible.

The danger to which the patient is exposed by the operation is less than that which he undergoes by delay. In the latter case, inflammation and gangrene of the part, with similar affections of the other viscera, and the highest degree of sympathetic constitutional irritation, are surely produced by a continuance of the incarceration. In this state the operation is performed under the greatest disadvantage, as the local and general disorder both threaten a fatal termination. If we operate while the parts are uninflamed, the risk of the operation only is endured*.

Our conduct must not be guided merely by the duration of the case; the kind of strangulation, the nature of the symptoms, the effect of the means employed, and the state of the parts, must influence

ratio tanquam unicum remedium, quod, ut jam differatur, nil est, quod suadet, cum ab hoc solo salus expectanda sit, cum increseat omni momento periculum vitæ." *Novi Commentarii*, tom. ii, p. 63.

* "Certum hujus operationis periculum de nimia operationis dilatione pendet, si ægroti jam viribus exhausti partes elapsæ gravissima phlogosi, in gangrænam prona correptæ, et morbus ad reliqua contenta abdominis propagatus fuerit." — *CALLISEN, pars poster. p. 478.*

our determination. Small and recent herniæ, or such as, having been kept up for a long time by means of a truss, are suddenly reproduced, admit of very little delay. The strangulation is violent in such instances; and inflammation and gangrene soon come on. In old and large ruptures, which have been often down, and often replaced, the symptoms are not so urgent, nor the necessity of operating so pressing*.

The event of the operation, under any circumstances, is uncertain: but its frequently unfortunate termination arises in most cases, from its being delayed until the state of the protruded parts, or of the system, leaves little chance of success.

It is hardly necessary, in the present day, to combat the opinion, that any time previous to the actual occurrence of gangrene, is early enough for the operation. Inflammation, when it has proceeded to a vehement degree, will certainly end in gangrene: and persons have often died of incarcerated hernia without the complaint proceeding to the termination in mortification.

The danger of delay has appeared so clearly to the best writers on the subject, that they have taken great pains in inculcating the necessity of an early recourse to the operation. The most celebrated

* I have mentioned some instances already (note in chapter iv, section ii), where strangulated hernia proved fatal within one day. LE DRAN has related a case in which the operation was performed on the seventeenth day, and the parts were not much affected. — Obs. 57.

practitioners on the Continent agree on this point with the great surgeons of our own country; and the dangerous and fatal effects of delay are strongly represented in many parts of their writings*. Several extracts from works of the highest authority might be adduced in support of this assertion: but I shall content myself with a quotation from the *Practical Observations*† of Mr. HEY: this is particularly valuable, as it exhibits a comparative view of the event of the operation, when performed at a proper time, and when improperly delayed. When this gentleman first began practice, he considered the operation as the last resource, and only to be employed when the danger appeared imminent. “By this dilatory mode of practice,” says he, “I lost three patients in five, upon whom the operation was performed. Having more experience of the urgency of the disease, I made it my custom, when called to a patient, who had laboured two or three days under the disease, to wait only about two hours, that I might try the effect of bleeding (if that evacuation was not forbidden by some peculiar circumstances of the case) and the tobacco clyster. In this mode of practice I lost about two

* See POTT's *Works*, vol, iii, p. 286; BERTRANDI, *Traité des Opérations*, p. 21; WILMER, *Pract. Obs. on Hernia*, p. 75; RICHTER, *Tr. des Hernies*, p. 105 and 106; CALLISEN, *Syst. Chir. Hod. pars poster.* p. 473; COOPER, *Anat. &c. of Inguinal Hernia*, p. 26; PELLETAN, *Clinique Chirurgicale*, tom. iii, p. 49; BOYER, *Traité des Mal. Chirurg.* tom. viii, p. 93.

† Page 143.

patients in nine, upon whom I operated. This comparison is drawn from cases nearly similar, leaving out of the account those cases in which gangrene of the intestine had taken place. I have now, at the time of writing this, performed the operation thirty-five times: and have often had occasion to lament that I performed it too late, but never that I had performed it too soon."

We may state, therefore, as the general inference from what has been now advanced, that a person can be rescued from that danger, to which he is exposed by a strangulated rupture, only by the efforts of art: that the constant and generally rapid progression of such cases from bad to worse renders it necessary, that the surgeon lose no time in giving a fair trial to the most powerful means, in order that, if these are inefficacious, the operation may be performed before the prolapsed parts become inflamed and painful: that an operation, done under such circumstances, has every chance of success: but that if symptoms denote inflammation or gangrene, the chances of a favourable event are much lessened, although the indication is still more urgent *.

* A most singular opinion, respecting the operation for strangulated hernia, has received the sanction of the celebrated HERBEN; and I am induced to notice it here, because the authority of a name so much respected might sanction a practice leading inevitably to the most fatal consequences. He regards the use of the knife as rarely, if ever, advisable; and professes himself altogether at a loss for rules of judging what cases are proper for the operation, and at what time it should be resorted to. See his *Commentaries*, p. 273. It will not be ne-

I shall describe the operation when speaking of the inguinal hernia; and the account then given will apply to the other species also, except in particular points, which will be noticed afterwards.

cessary, after the foregoing observations, to accompany this statement with any comment. I shall only place by the side of it the sentiments of a writer not less experienced than Dr. H., and whose opinion on a surgical subject will claim at least equal authority. “ Grave illud periculum quod hernia parit incarcerata, certo præsentissimoque chirurgia tollit remedio, operatione scilicet illa, quæ herniotomia vocatur.” RICHTER, in *Comm. Goett.* tom. v, p. 56.

CHAPTER IX.

ANATOMY OF INGUINAL RUPTURES.

I PREFACE the account of inguinal hernia with a description of the parts in which it occurs ; since an accurate acquaintance with them will elucidate its origin, progress, and treatment ; and, when operations are required, will inspire that rational confidence so essential to their successful performance. Without this anatomical knowledge a surgeon cannot proceed with satisfaction to himself, nor without danger to the patient. We cannot be surprised to find that he puts off decisive measures to the last moment, and, in the hope of escaping from the performance of what he dreads, wastes that time, which ought to be occupied in the operation, in the repetition of trials already found unavailing.

The kind of knowledge, which I allude to, would be sought in vain in the most approved writers on hernia : for anatomy has hitherto been very little studied in reference to its connection with surgery. I cannot therefore mean to cast any reflection on those surgeons, whose writings have extended and improved the latter art, when I state that their works show an ignorance of this subject : the fault does not rest with them individually, but belongs to the time in which they lived. A few observations on particular points lie scattered in the works of dif-

different writers: but no complete description, and accurate delineation of even the common kinds of hernia, as the inguinal, femoral, and umbilical, existed previously to the late excellent works of CAMPER*, COOPER†, SCARPA‡,

* *Icones Herniarum*, Editæ a S. T. SOEEMMERRING, Francof. fol. 1801. These plates represent several important points in the anatomy of inguinal hernia, in that accurate and expressive style of delineation, which was peculiar to CAMPER. It must be observed, that although they were not published till after the author's death, they had been engraved as early as the year 1757.

† *Anatomy and Surgical Treatment of Inguinal and Congenital Hernia*, Lond. fol. 1804; *Anatomy and Surgical Treatment of Crural and Umbilical Hernia*, &c. fol. 1807.

‡ At the time of its appearance, the work of RICHTER, originally written in German (*Von den Brüchen*, 8vo. Goetting, 2 v. 1778, and 1779. 2d Edit. in one vol. 1785), and translated into French by ROUGEMONT (*Traité des Hernies*, 4to. BONN, 1788) was the most comprehensive that had been published on this subject: it will be always valuable for the clearness, good sense, and extensive research, which are conspicuous throughout, and particularly for the description of symptoms, and the practical directions, which derive great weight from the author's long experience. Of the anatomy of ruptures he was quite ignorant; and SCARPA alleges this circumstance as the motive for his publication, *Sull'ernie Memorie Anatomico-Chirurgiche*, Milano, 1809, in Atlas folio; translated into French under the title of *Traité Pratique des Hernies, ou Memoires Anatomiques et Chirurgicaux sur ces Maladies*, Paris; 8vo. with Atlas in folio; and into English, with reduced engravings in 8vo. by Mr. J. H. WISHART, as a *Treatise on Hernia*, Edinburgh, 1814.

The expectations, which the preceding publications of this consummate anatomist are so well calculated to excite, are completely satisfied by the anatomical accuracy, the taste, the masterly execution, and beauty of the original engravings, and the

HESSELBACH *, CLOQUET †, and LANGENBECK ‡.

scientific clearness and simplicity of the accompanying illustrations. The plates of the French translation, although in smaller form than those of the original, are very well executed, not only representing all the anatomical facts, but possessing something of the beauty of those, from which they were copied. As this and the English translation are in much more common use than the Italian original, I have always quoted them in the present work; and, for a similar reason, I have referred to the French translation instead of the original German of RICHTER.

* Dr. F. C. HESSELBACH of Würzburg has lately published, at that place, a work in German, entitled *New Anatomico-Pathological Investigations concerning the origin and progress of Inguinal and Femoral Ruptures*, with fifteen plates, 4to. devoted entirely to the anatomy, and containing a short but correct account of the principal circumstances relating to the natural structure of the inguinal region, and to the anatomy of the two kinds of inguinal and of the crural hernia. Although the plates are coarsely executed, and the work, both in this respect, and in copiousness of detail and illustration, is not to be compared to the valuable productions of COOPER and SCARPA, it is very creditable to the author's industry and research, if he was ignorant, as he appears to have been, of the facts which had been ascertained by those great anatomists and surgeons.

A Latin translation of the work of HESSELBACH was published at Würzburg in 1816, under the title *Disquisitiones Anatomico-Pathologicæ de ortu et progressu Herniarum Inguinalium et Cruralium, cum. tab. XVII. æneis*. The two additional plates contain delineations of an instrument designed to assist the surgeon in detecting the source, and arresting the progress of hæmorrhage, when arteries are wounded in the operation for strangulated hernia.

† *Recherches Anatomiques sur les Hernies de l'Abdomen*; avec quatre planches; 4to. Paris, 1817; *Recherches sur les Causes et l'Anatomie des Hernies Abdominales*; with ten lithographic plates; 4to. Paris, 1819; in the CONCOURS pour la place de chef des travaux anatomiques.

‡ *Commentarius de peritonæi structura, testiculorum tunicis,*

SECTION I.

Anatomical Description of the Openings through which Inguinal Ruptures take place.

THE aponeurotic expansion, which constitutes the tendon of the external oblique muscle of the abdomen, besides its connection to the whole length of the linea alba, is attached to the anterior superior spinous process of the ilium, and to the upper part of the pubes. Its lower margin, which is rather thickened and stretched between these two points, is best known by the name of POUPART'S or FALLOPIUS'S ligament, and is now very commonly described under the term of the crural arch *. As the fibres of the aponeurosis pass obliquely downwards and forwards, they separate into two distinct portions, which constitute the pillars or columns of the abdominal ring. The upper and inner of these is fixed to the symphysis pubis: the lower and outer (which is indeed the above-named ligament of POUPART) is attached

eorumque ex abdomine in scrotum descensu, ad illustrandam herniarum indolem; 8vo. cum tabulis xxiv, æneis in folio; Göttingen, 1817. In the numerous well-selected and well-executed figures of this work, the zealous and indefatigable author, who, as Professor of Anatomy and Surgery at Göttingen, so ably sustains the reputation of that celebrated University, has represented most of the important points in the natural and pathological state of the parts, which are the seat of inguinal, crural, and congenital ruptures.

* For further particulars concerning this part the reader is referred to the "Description of the parts in which the femoral rupture is situated." Chap. xiv, sect. i.

to the spine and crista of the bone. The separation of these tendinous columns leaves a triangular space, called the abdominal ring, or ring of the external oblique muscle, through which the spermatic cord passes in the male, and the round ligament of the uterus in the female subject. The os pubis constitutes the base of the triangle; the two pillars form its sides; and the apex is the part at which these separate from each other. It is not, however, pointed; since some transverse fibres, which connect the two columns together, round off this upper part of the opening: these are found particularly strong in an old hernia. The abdominal ring is directed obliquely upwards and outwards; the upper part of it pointing towards the spine of the ilium: this part is often mentioned by the name of the *external angle* of the ring. The base of the triangle is situated downwards and inwards with respect to the apex; and the two sides, of which one is external and the other internal, are continued from the apex obliquely downwards and inwards to the basis*.

The size of the aperture varies much in different individuals: sometimes it closely embraces the cord, or round ligament; in other instances, the pillars

* If we employ the new terms of Dr. BARCLAY, the superior column of the ring is atlantal and mesial; the inferior sacral and lateral; the apex of the ring is atlanto-lateral; the basis sacro-mesial; the internal side is mesial, and the external lateral; the atlantal ends of these two sides are lateral, and their sacral ends mesial.

remain separate to a considerable distance above those parts.

It is smaller, and the pillars are less strong, in the female, than in the male.

The aponeurosis of the internal oblique muscle is separated through its greater part into two layers, of which the anterior and thicker joins the tendon of the external oblique, the posterior and thinner is attached to that of the transversus; but the lower portion of this tendon, together with the corresponding part of the transversus, goes wholly in front of the rectus muscle. The lower margin of these two muscles (the obliquus internus and transversus), which arises from about the upper half of Poupart's ligament, is found behind or within the outer column of the abdominal ring, and is fixed to the pubes behind the ring*.

A thin fascia is extended from the posterior edge of Poupart's ligament upwards between the peritoneum and the transversus, on the surface of which it is gradually lost. By this, the ring of the external oblique is closed towards the abdomen; and, but for this, there would be a direct opening into the cavity of the belly behind the ring†. The fascia in

* The attachment of the transversus to the pubes is noticed by WINSLOW, sect. iii, § cxi, and by GUNZ, *Obs. Anat. Chir. de Herniis*, p. 18.

† It has been hitherto an almost universally received opinion, that the abdominal ring is covered by peritoneum only at its posterior surface, and consequently, that the contents of a rupture are protruded directly from the abdominal cavity. Were this a correct representation, inguinal hernia would be much

question consists of a thin and delicate expansion. MR. COOPER, who first noticed it, under the name of *fascia transversalis*, has rightly observed, that in some subjects it appears only as condensed cellular membrane *. If, after carefully removing the transversus, we press with the finger above Poupart's ligament, we shall experience a greater resistance than the unsupported peritoneum could offer; and this arises from the fascia transversalis.

Yet it often has a very distinct tendinous structure at its attachment to the crural arch. If we trace it from this part upwards, we shall find it divided immediately into two portions, an internal and external; which leave between them a considerable interval, just in the middle of the crural arch. The former of these, which is the strongest, and most decidedly fibrous, is connected by its inner edge to the outer margin of the rectus abdominis, and to the inferior margin of the tendon of more frequent than it actually is. The following quotation from RICHTER will show the opinion generally held on this subject. After describing the aperture in the tendon of the obliquus externus, he proceeds thus. " Derriere cette fente uniquement remplie par du tissu cellulaire et par les parties mentionnées est placée le Péritoine, qui n'est recouvert par aucun muscle, et qui doit non seulement résister à la force distendante, mais encore au poids des visceres de l'abdomen. Cet endroit est ainsi naturellement très foible, et facilite d'autant plus la formation des hernies qu'il est placé en bas." p. 15.

* Page 6. MR. J. CLOQUET calls it " une expansion fibreuse quelquefois purement celluleuse." *Recherches Anat.* p. 25. Numerous representations of this fascia are given in the plates of MESSRS. COOPER and CLOQUET.

the obliquus internus and transversus; and both are gradually lost above, between the peritoneum and transversus. The posterior surface of this aponeurosis is lined by the peritoneum.

On examining the parts from the cavity of the abdomen, we find that the peritoneum, where it lines the iliac region, exhibits two superficial excavations, separated by a falciform partition. The latter, formed by the fibrous cord, representing the umbilical artery of the fœtus, and a duplicature of peritoneum inclosing it, stretches from the side of the bladder, obliquely upwards and inwards, towards the navel: it is broadest below, and gradually becomes narrower above, ending about two inches short of the navel; its falciform edge is loose, and turned towards the cavity. The situation of this fold is a little on the inside of the aperture in the fascia transversalis, or, in other words, is placed mesially with respect to it. In their relative position to each other, one depression is external (lateral) and a little superior; the other internal (mesial) and a little inferior.

The peritoneum is connected to the abdominal parietes, in the inguinal region, by a loose cellular tissue, which readily yields to the force that protrudes the viscera, and allows the membrane to be extended sufficiently to envelop the largest protrusions. This soft cellular substance accompanies it when protruded, and connects it to the surrounding parts, *viz.* to the spermatic vessels and vas deferens, the cremaster and the common sheath of the cord.

The opening in the fascia transversalis is situated in the external fossa; the internal corresponds to the ring of the external oblique muscle; the fascia transversalis, and the tendinous insertions of the transversus and internal oblique being interposed between them.

Since the fascia transversalis is situated behind the obliquus internus and transversus muscles, the division between its two portions is covered by these muscles, except in the immediate neighbourhood of the crural arch, where a small part of it appears under their lower margin. This opening gives passage to the spermatic cord, and to the round ligament of the uterus; and was first described by Mr. COOPER, in his work on Inguinal and Congenital Hernia. The superior margin of this aperture is formed by the lower edge of the obliquus internus and transversus: which can be felt very distinctly by the finger passed obliquely upwards and outwards, through the ring of the external oblique muscle. The other sides of the opening, which are sometimes not very clearly defined, are formed by the fascia transversalis*.

The spermatic vessels, placed behind the peritoneum, descend from the loins, over the surface of the psoas and iliacus internus muscles, connected to them and to the membrane by loose cellular substance; and arrive at the division between the two

* This opening, and the relation of the spermatic and epigastric vessels to it, are clearly represented by HESSELBACH, tab. iii, iv, v, and vi.

portions of the fascia transversalis. Here they are joined at an angle more or less acute by the vas deferens: and the spermatic cord, which results from this junction, making a sudden bend inwards, passes through the opening, and consequently under the fleshy margin of the obliquus internus and transversus*; the exact situation of its passage being marked by a slight depression of the peritoneum †. It then goes obliquely downwards and in-

* The part at which the spermatic vessels leave the abdomen was first represented by CAMPER in his *Demonstrationes Anatomico-Pathologicae*, published in 1760. The *Icoënes Herniarum* of the same author, which were engraved still earlier than this, represent the same circumstance. WINSLOW also mentions this part without describing it very minutely. Sect. iii, § xciv.

SCARPA says of the spermatic cord, "Il penetre à travers les fibres inférieures de l'oblique interne, qui s'écartent pour lui livrer passage; mais il ne fait que glisser sous le bord charnu inférieur du muscle transverse." P. 25.

† SCARPA notices this as "un petit enfoncement en forme d'entonnoir," of which the progressive development forms the hernial sac. P. 44.

Mr. CLOQUET, who has investigated very minutely this part of the subject, describes certain appearances in the cord, connected with this peritoneal depression, and explained by him as vestiges of foetal structure. He has found them in male subjects of all ages, and almost as frequently in the old as in the young. The slight depression of the peritoneum sometimes adheres simply to the cord by a dense cellular tissue, in the form of a slender filament, which is soon lost in the cellular substance of the spermatic vessels. Or there may be a long whitish fibro-cellular cord, which can be traced to the tunica vaginalis. Such a cord, instead of being solid, may present oblong serous cavities, two, three, or four in number, separated by contracted intervals, admitting of inflation, and either ending by a blind extremity, or communicating with

wards, between the fascia transversalis and the aponeurosis of the external oblique*, being increased in size by the addition of a few thin muscular fibres, called the cremaster muscle†, derived from the lower edge of the internal oblique, and from the crural arch. The cord finally emerges through

the cavity of the tunica vaginalis. Sometimes there is an elongated cavity, measuring an inch or an inch and a half, extended towards its end, and connected to the peritoneum by a narrow neck, which may be either solid, or perforated by a fine opening. The peritoneum exhibits a manifest cicatrix at the point of attachment. The sides of the cavities above described are smooth, and moistened by a serous secretion, which may increase in quantity, and form encysted hydrocele of the cord. Not unfrequently the tunica vaginalis, contracted to a slender tube, ascends in front of the cord, nearly to the abdomen, and joins the peritoneum by means of a small solid stalk. In all the cases just enumerated the cavity of the tunica vaginalis is distinct from that of the peritoneum; but they may be connected, either by a narrow canal, with contractions at intervals, or by a shorter and larger communication. *Recherches Anat.* p. 39; note ii, and pl. iv.

* The passage of the spermatic cord through a canal, previous to its penetrating the ring of the external oblique, is expressly stated by GIMBERNAT, in his *Account of a New Method of operating for Femoral Hernia*, p. 19 and 32.

† This muscle has been more minutely described by Mr. J. CLOQUET, according to whom its fibres first descend in front of the cord and testicle, then turn and ascend in an opposite direction to be fixed to the pubes, some of them going only just below the ring, while others reach to the bottom of the tunica vaginalis. Thus they form in front of the cord and testicle a series of inverted arches, the concavity of which is deepest below, and gradually shallower above. The ascending portion and its attachment to the pubes are sometimes wanting. *Recherches Anat. sur les Hernies*; p. 13 et suiv. pl. ii, and pl. i, fig. ii.

the opening in the tendon of the obliquus externus, and then turns suddenly downwards; lying not so much on the bone between the two columns of the ring, as on the outer column itself, so as to cover its insertion into the pubes. The parts composing the cord are connected together throughout by a copious cellular substance.

Thus the vessels of the testicle, making two remarkable turns, pursue three different directions in the successive parts of their course. They descend, inclining at the same time a little outwards, from the loins to the opening in the fascia transversalis; then they bend inwards and forwards between that fascia and the aponeurosis of the external oblique, making a curve, of which the concavity is turned towards the pubes; they make a second turn with its convexity towards the pubes, and lastly descend straight to the testicle.

The parts composing the cord are connected together throughout by a copious cellular substance. The whole is surrounded externally by a condensed investment of tolerably close texture, which, in conjunction with the cremaster, forms a general covering to the cord and testicle, and is connected to the margin of the abdominal ring.

The foregoing description shows, that the opening in the abdominal parietes, for the passage of the spermatic cord, is not a ring, or simple round aperture, but an oblique canal, which may be properly termed the *INGUINAL CANAL*. The crural arch, with the aponeurosis of the external oblique inserted

into it in front, and the fascia transversalis behind, forms a narrow and deep channel, resting on the psoas and iliac muscles and the femoral vessels, extending from the anterior superior spine of the ilium to the pubes, giving attachment to the fibres of the internal oblique and transverse muscles, and lodging in its internal and lower half the spermatic cord and round ligament. The front of this channel is formed by the aponeurosis of the external oblique, which presents, at its lower and inner part, immediately above the pubes, the triangular aperture, usually called the abdominal ring, but now more appropriately termed the *lower or external aperture of the inguinal canal*. The posterior boundary is the fascia transversalis, the opening in which constituting the *upper or inner aperture of the inguinal canal*, is placed higher than the preceding, and more externally, being distant from it about an inch and a half*. The distance between these two apertures

* I subjoin the statement of the exact measures of these parts, as given by Mr. COOPER, in the second part of his work on Hernia.

IN THE MALE SUBJECT.		FEMALE.
	Inches.	Inches.
From the symphysis pubis to the anterior superior spine of the ilium.....	5 $\frac{3}{4}$	6
.....tuberosity of the pubes	1 $\frac{1}{8}$	1 $\frac{3}{8}$
.....inner margin of the lower opening of the abdominal canal.....	0 $\frac{7}{8}$	1
.....inner edge of the upper opening..	3	3 $\frac{1}{4}$

determines the length of the inguinal canal, which is obliquely traversed by the spermatic cord. Between the ilium and the upper aperture of the inguinal canal, the channel of the crural arch contains only the looser portion of the internal oblique and transverse muscles; between the two apertures it forms the inguinal canal, and is occupied by the same muscles, with the addition of the spermatic cord*.

The epigastric artery, springing from the external iliac trunk, close to Poupart's ligament, goes behind the spermatic cord, intersecting it just before that cord enters the abdominal canal. It then

IN THE MALE SUBJECT. FEMALE.	
	Inches. Inches.
From the symphysis pubis to the middle of the	
iliac artery.....	3 $\frac{1}{8}$.....3 $\frac{3}{8}$
.....vein.....	2 $\frac{5}{8}$.....2 $\frac{3}{4}$
.....origin of the epi-	
gastric artery.....	3 .....3 $\frac{1}{4}$
.....course of the epi-	
gastric artery on	
the inner side of	
the upper opening	2 $\frac{3}{4}$.....2 $\frac{7}{8}$
.....middle of the lu-	
nated edge of the	
fascia lata.....	2 $\frac{3}{4}$.....3 $\frac{3}{4}$
From the anterior edge of the crural arch to the	
saphena major vein	1 .....1 $\frac{1}{4}$
From the symphysis pubis to the middle of	
the crural ring.....	2 $\frac{1}{4}$.....2 $\frac{3}{8}$

* The terms of Dr. BARCLAY would enable us to express more accurately the relative position of the two openings of the abdominal canal. The aperture in the tendon of the obliquus externus is sacral, mesial, and dermal; that of the fascia transversalis is atlantal, lateral, and central.

ascends obliquely inwards, between the peritoneum and the fascia transversalis, in general precisely along the inner margin of the superior aperture of the ring, but sometimes a little nearer to the pubes, passing at the distance of nearly an inch from the upper extremity of the ring of the external oblique* to the posterior surface of the rectus muscle, which it reaches after a course of about two inches and a half†. It is accompanied by two veins, which end by a single trunk in the iliac vein, a little below the origin of the epigastric artery : the largest of these veins lies between the artery and the pubes‡.

* When the two columns of the ring remain separated further than usual, so that this aperture is long, its external angle or apex is proportionally nearer to the course of the epigastric artery.

† HESSELBACH, tab. vi; SCARPA, tom. i; COOPER on *Inguinal Hernia*, pl. ii; on *Crural Hernia*, pl. ii, fig. vi; pl. v, fig. iii.

‡ For the use of students I subjoin a short direction for the dissection of the parts described in this chapter. After exposing the tendon of the obliquus externus at its lower part, and particularly where it forms the crural arch, as well as at its double insertion into the pubes, let a transverse incision be made through it, beginning at the linea semilunaris, about an inch above the situation of the navel, and carried directly outwards. From the termination of this cut a perpendicular one should be extended to the crista of the ilium; and the obliquus externus should be separated from that part of the bone. The incision must now be continued through the tendon, parallel to the crural arch, and just above it, as far as the lower opening of the abdominal canal, leaving that, however, entire. By turning the flap, thus separated, over towards the linea alba, we gain a view of the spermatic cord passing between the two openings; of the inferior margin of the obliquus internus and

The concavity of the curve, described by the spermatic vessels and vas deferens at their entrance into the inguinal canal, seems to rest on and be supported by the epigastric vessels. When the latter are removed, however, we find that the cord of the testicle is principally supported by the inner edge of the aperture in the fascia transversalis, which sustains them entirely when the epigastric artery runs nearer than usual to the pubes.

When we consider the thinness of the lower margin of the internal oblique and transverse muscles, that an opening is left under them for the passage of the spermatic cord, and that the ring of

transversus, which are here united into one, crossing over the cord to be fixed into the pubes behind the ring; and of the cremaster expanding over the spermatic vessels. A careful reflection of the muscles just mentioned, from the crural arch, will bring the fascia transversalis into view, with the passage of the cord in the space left by its division; and a very little dissection will expose the epigastric artery on the inner edge of the upper opening of the canal. By laying down again in its place the reflected portion of the internal oblique and transverse muscles, their relation to the course of the spermatic cord may be exactly ascertained; and, as the attachment of the external oblique to the pubes still remains, the distance and relative position of the two openings may be immediately perceived. The most natural view of the superior aperture may be taken from within, by carefully removing the peritoneum from the crural arch, and adjacent parts. The fascia transversalis, with its division, may be then seen without any farther dissection; the entrance of the spermatic vessels and vas deferens into the canal, and the course of the epigastric vessels, are exposed in their most natural position; and the connection of the fascia transversalis to the edge of the rectus is clearly seen.

the external oblique is protected behind only by the aponeurosis formed by the fascia transversalis and the tendinous insertions of the two former muscles, we shall readily perceive this to be the weakest part of the abdominal parietes. Its position in the lower region of the belly, by subjecting it to greater pressure, concurs with this weakness in making it the most frequent seat of rupture.

In inguinal hernia, the parts are generally protruded directly over the spermatic cord; at first, therefore, they penetrate the upper opening, and afterwards, having traversed the canal, make their appearance through the ring of the external oblique. They may enter the upper opening, and remain in the canal, without continuing their course through the lower one; or they may come directly through the inferior aperture, without passing along the canal. Each of these varieties will require a separate description. In the two first cases, the parts are protruded at the external excavation or fossa of the peritoneum; in the last, at the internal. (See page 180.)

The description of these parts is the same in the female, where the round ligament of the uterus supplies the place of the spermatic cord; except that the opening in the tendon of the external oblique is considerably smaller.

SECTION II.

Anatomical Description of External Inguinal Hernia, or that which comes through the Inguinal Canal.*

THE great majority of inguinal ruptures come under this description. The viscera are protruded through the opening left between the two portions of the fascia transversalis, and under the margin of the internal oblique and transverse muscles; that is, at the point where the tunica vaginalis communicates with the abdomen in the foetus, and where the spermatic cord passes out in the adult. They pass through the abdominal canal, in close contact with the anterior surface of the cord, and come out at the aperture in the tendon of the external oblique muscle. The mouth of the sac is the upper opening of the canal, and is therefore placed nearly in the middle of the space between the anterior supe-

* It is called by HESSELBACH *external*, in contradistinction to that which is described in sect. iv of the present chapter, which he calls *internal* inguinal hernia. These terms, of which the former is equivalent to *lateral* and the latter to *mesial* of Dr. BARCLAY, are derived from the relative situations at which the herniæ first protrude from the abdomen. The *external* or common inguinal rupture passes out on the outer side of the line described by the course of the umbilical artery, or of the intersection of the spermatic cord and epigastric artery; the latter on the inner side of the same line or intersection. See SCARPA, m. i, sect. xxvi, in which he quotes HESSELBACH'S *Anatomico-Chirurgical Treatise on the Origin of Inguinal Ruptures*, in German, with four plates. Würzburg, 1806.

rior spine of the ilium and the angle of the pubes : from this point the neck of the sac extends obliquely downwards and inwards between the aponeurosis of the external oblique, and the fascia transversalis ; and the production of peritoneum, escaping through the lower opening of the canal, is continued directly downwards*.

When the hernia is first formed, the distance between the two openings, and their relative position, are the same as in the natural state. But the pressure of the protruded viscera, by enlarging the superior aperture, gradually brings it nearer and nearer to the inferior ; so that in an old and large rupture, the opening into the abdomen is almost direct. The effect of this process is such, in all cases, that we seldom meet with an instance, in which the rupture has passed the tendon of the external oblique, where the natural distance between the two openings is preserved.

The peritoneum, being protruded directly over the spermatic vessels, passes between these and the cremaster muscle, in the loose cellular tissue which unites them. The cremaster, together with a condensed cellular substance, partly attached to the margin of the ring, partly continuous with the fascia superficialis, forms a covering, which envelops the cord and the testis with its membranes, being united to them by a loose and easily separable tis-

* The general course of the protrusion, its oblique passage through the inguinal canal, and the distance between the two apertures of that canal, are well exhibited by LANGENBECK, tab. xiii and xiv.

sue, and is described by some anatomists as the *tunica vaginalis communis* of the spermatic cord*. The peritoneal process distends this soft tissue, and passes between that tunic and the spermatic vessels; it is consequently provided with an exterior investment from this source; and the covering is common to it with the cord and testis†.

The hernia, as it descends into the scrotum, con-

* The fibres of the cremaster, says SCARPA, “ parvenues au-dehors de l’anneau, deviennent très flexueuses, se répandent dans différens sens, et se croisent de diverses manières, jusqu’à ce qu’elles se terminent toutes dans une sorte de gaine tendino-membraneuse, qui renferme le cordon spermatique avec son enveloppe cellulaire, et la tunique vaginale du testicule.” p. 24. The facts are beautifully represented in pl. i and ii.

The origin and nature of this external investment of the testicle and cord are somewhat differently described by Professor LANGENBECK. He says, that the peritoneum everywhere consists of two laminae; an *external*, connected by cellular substance to the tendinous and muscular parietes of the abdomen; an *internal*, forming the serous bag which contains the viscera. The former is not to be regarded as merely cellular, but has a close membranous structure, and can be separated and turned back from the latter, as a distinct and uniform texture. *Comment.* sect xxiv and xxv. The kidneys, ureters, bladder, spermatic and other vessels at the back of the abdomen, are placed between these two layers of peritoneum, enveloped by the external, but situated on the outside of the internal. *Ibid.* sect. xxxii. The peritoneum, which descends with the testicle, is a production of both these layers, the spermatic cord being placed between them. P. 62. The external layer, which includes the testicle, the cord, and the process of the internal or serous layer, constitutes the *tunica vaginalis communis*; and it forms the exterior covering of the hernial sac in external inguinal ruptures. See tab. i — iv, also viii, ix, and x.

† The relation of the external covering to the hernial sac, the testis, and cord, is well exhibited in LANGENBECK, tab. x.

tinues still in front of the spermatic vessels (with exceptions to be noticed presently), is still involved together with them by the tunica vaginalis communis, and arrives at last at the upper end of the testis, where the spermatic vessels terminate in that gland, and the common tunic is connected by a closer and stronger texture to the tunica vaginalis testis. Here its descent terminates, and we see a mark of division at this point, between the bottom of the sac and the testis, in the oldest scrotal ruptures, when they are dissected.

Some tendinous fibres, derived from the aponeurosis of the external oblique, where it forms the lower opening of the inguinal canal, may be occasionally seen in this external investment. The pressure of the tumour occasions a considerable thickening of the part in old herniæ, where several distinct layers may often be recognized; and the thickness of the sac, taken altogether, depends on this circumstance*.

The fibres of the cremaster, in the natural state, are few, thin, and pale; they are increased when inguinal hernia has existed for some time, and acquire a surprising development in large old scrotal ruptures, where they consist of thick and red bundles

* “ Je puis assurer, d’après un grand nombre d’observations, que, dans la plupart des cas, *le sac herniaire proprement dit*, ne s’épaissit pas sensiblement, et qu’en général il ne diffère point des autres parties du péritoine, quelle que soit le volume et l’ancienneté de la hernie scrotale.” SCARPA, p. 53.

irregularly interwoven, spread from the upper and anterior towards the lateral and lower parts of the swelling.

The external pudic vessels are distributed about the sac and integuments, and their branches acquire a considerable size in old scrotal ruptures*.

Surgeons in general have not been aware of the existence or origin of the external covering now described. They have supposed the hernial sac to consist merely of peritoneum in various states of density: and represent the thickened state, in which it is frequently found, to arise from distension. Yet some writers have understood the real nature of the case. MERY† found three coverings over the sac in a very large hernia; and PETIT‡, in describing the operation, speaks of exposing and dividing “the membranes common to the hernia, with the spermatic cord and testicle.” The peritoneal sac, according to MAUCHART§, is surrounded by a thicker external coat, separable into many layers, and having in its composition tendinous fibres derived from the aponeurosis of the external oblique muscle: for which reason he calls it *tunica aponeu-*

* CAMPER, tab. xiii.

† *Mem. de l'Acad. des Sciences*, 1701. “Observations sur les Hernies.”

‡ *Trait. des Mal. Chirurg.* tom. ii, p. 362.

§ *Dissertatio de Hernia Incarcerata, nova Encheiresi extricata.* Tubingen. 1722; and in HALLER *Disput. Chirurg. Select.* tom. iii. “*Saccus externus multo crassior est interno, inque varias separari lamellas potest,*” &c. cap. ii.

rotica. The latter fact is noticed also by GUNZ*. SHARP† very correctly observes, that “when the herniary sac falls into the groin or scrotum, the investing membrane (of the spermatic cord), together with the cremaster muscle, which covers it, become distended, and form, in consequence of that violence, an absolute vagina.” The exterior covering of the hernia is not only described but delineated by WRISBERG‡. He calls it *velamen accessorium*, and represents it in the view of a dissected oscheocele. A most explicit statement of the anatomical structure, with some excellent views of the parts, will be found in CAMPER§, from whom I take the following quotation:—“Cremasteres igitur musculi sunt, ab obliquo interno et transverso abdominis orti, per involucrum membranaceum sub cute scroti dispersi, quocum velamentum efformant, funiculum spermaticum et testem undequaque cingens, quod in herniosis crassius tenaxque fit, et ex multis sibi invicem impositis lamellis constare videtur, cum chirurgia hernias attingimus. Velamentum illud facile a sacco herniæ digitis separatur, firmiter autem adhæret vasis spermaticis.” Lastly, a full description and representation of the facts are

* *Observationum Chirurgicarum de Herniis Libellus*. Lipsiæ, 4to, 1744, p. 50—51.

† *Critical Inquiry*, ed. iii, p. 5.

‡ *Commentationes reg. soc. scient. Gottingens.* 1778, p. 69.

§ *Icones Herniarum*, p. 13. The hernial sac and testis, inclosed in their common investment, are well exhibited in tab. vi and ix; with the latter laid open in tab. viii and x.

contained in Sir A. COOPER's *Anatomy and Surgical Treatment of Inguinal and Congenital Hernia*, and in the work of SCARPA*.

- The spermatic cord, since the viscera are protruded directly over it, is placed behind the hernial sac†. If the tumour has descended to the bottom of the scrotum, the cord lies behind it, through its whole course, and the testis, with its coverings, is in contact with the lower end of the swelling. Where the rupture is not so large, more or less of the cord can be felt between the lower end of the tumour and the testis. I have already described the common covering of the hernia, cord, and testicle, made up of the cremaster muscle and tunica vaginalis communis: this is connected universally by cellular adhesions to the parts which it invests, and more closely to the spermatic vessels than to the sac. The latter part adheres firmly by similar adhesions to the spermatic vessels; and would require a very cautious dissection for its separation in the living subject.

* His description is very similar to that of CAMPER, quoted above. "A l'endroit où le cordon spermatique et le sac herniaire réunis, passent dans l'écartement des fibres inférieures du petit oblique, on voit le muscle crémaster se porter sur leur côté externe, et les accompagner jusqu'au-delà de l'anneau, où il se convertit, comme je l'ai déjà dit, en une gaine musculaire et aponevrotique, qui, renfermant le sac herniaire, le cordon spermatique et la tunique vaginale, accompagne ces parties jusqu'au fond du scrotum." M. i, sect. xviii, and pl. i and ii.

† CAMPER, tab. v and xii.

The spermatic cord sometimes deviates from the course now described. LE DRAN* SCHMUCKER†, and Mr. BLIZARD‡ have seen it lying in front of the sac. In other instances, its component parts have been separated by the tumour. The vas deferens has passed on one side of the sac, while the spermatic vessels ran on the other§: or the former has been seen on the anterior and inner, while the vessels were placed on the posterior and outer part of the swelling||. In other instances the vessels have been before, and the vas deferens behind the sac¶.

The situation of the spermatic cord, at the upper opening of the canal, with respect to the sides of that aperture, hardly allows us to suppose, that the contents of a rupture can be protruded in any other direction than over it; but we can easily conceive, that the relation of the tumour to this part may be changed after it has passed the ring of the external oblique muscle, so as to present the varieties just enumerated.

SCARPA has explained this subject at considerable length; and rightly refers the separation of the vessels, which compose the cord, to the distension

* *Traité des Opérations*, p. 127.

† *Vermischte Chirurgische Schriften*, vol ii, p. 55. He mentions two instances.

‡ COOPER, pt. i, p. 49.

§ COOPER, pt. i, pl. v, fig. v.; POTT'S *Works*, vol. ii, p. 68; CAMPERI, *Icones Hern.* tab. xiii, fig. i; SCARPA, pl. iii.

CAMPER. tab. viii, fig. ii; HEY'S *Practical Obs.* p. 146; MONRO, *Morbid Anat. of the Gullet*, &c. pl. xvii.

¶ CAMPER, tab. viii, fig. i; COOPER, pt. i, p. ix and x.

of the surrounding parts, by the increasing tumour. It will be remembered, that the hernial swelling and the spermatic vessels are included in a common sheath; and that the latter are connected by cellular substance to each other, and to the production of peritoneum. So long as the protrusion continues, of moderate size, it does not affect the relative position of the parts composing the cord to each other or to the sac. When the swelling increases, all the surrounding parts are distended, and the cord, being so closely in contact with it, partakes of this distension: the loose cellular tissue connecting its vessels yields readily, and allows their separation to a greater or less distance from each other. This separation and displacement bear a proportion to the size of the rupture; they are also greater in the largest part of the swelling, and less above and below this situation. At the ring, the cord always is found behind the sac. In large and very old scrotal ruptures, the swelling sometimes passes so deeply between the component parts of the cord, that they are no longer found at the back of the sac, but at its sides, and even advance below towards its anterior surface. A similar change was found by SCARPA to occur in large and old hydroceles: the increase of the watery tumour affecting the spermatic vessels and the vas deferens in the same way as the growth of a rupture*.

The separation of the vas deferens and spermatic vessels is seen on both sides, in a case of old double

* Mem. i, sect. xxiv.

scrotal hernia now lying before me. They are about two inches apart, and at the back of the sac, on one side; and more considerably separated on the other, where the middle of the tumour has penetrated between them, so that they run quite laterally; lower down they advance anteriorly, to the testicle, so that they would probably have been divided by prolonging the incision through the whole length of the sac, particularly if it had been directed a little to one side.

When we consider that the epigastric artery in the natural state goes first behind the spermatic cord, and then along the inner margin of the upper opening, and that the viscera are protruded over the cord, it will immediately appear, that, in the case of bubonocoele, which we are now considering, the parts are protruded on the outer side of the artery, and that this vessel must be situated first behind the neck of the sac, and then on its inner side*. This is so precisely the case, that, if we examine the mouth of the sac towards the abdomen, its inner margin (the *mesial*, or that which is situated towards the pubes) seems to be actually formed by

* CAMPER, tab. v and xii; SCARPA, tom. iii; HESSELBACH, tab. ix, compared with tab. vi, representing the course of the vessel in the natural state. Compare also the three first of SCARPA's beautiful plates; and the two sides of the figures in Sir A. COOPER's viith, viiith, and ixth plates; in which the same contrast is seen.

LANGENBECK's xvith plate represents a case of double inguinal hernia; external on one side, internal on the other; with the difference in the course and situation of the epigastric artery.

the course of the artery. It retains always the same situation in respect to the mouth of the sac: but the approximation of the upper to the lower opening brings it nearer to the pubes*. In the natural state, it is about two inches from the angle of that bone, at the part where it bends along the inner margin of the opening; its distance at the corresponding part, in a bubonocèle now before me, is only three quarters of an inch.

The situation of this vessel, in relation to the neck of the hernial sac, is a point on which great variety of opinion has subsisted among surgical writers: this may have arisen in some degree from the actual variation in the position of the artery in the different forms of the complaint: but there can be no doubt that the chief cause has consisted in the want of a sufficient number of investigations, and particularly of the parts in their altered state. Thus RICHTER† supposes that the artery is found near the external angle of the ring in the ruptured, as well as the sound condition of the parts; and he supports his opinion by stating, that the vessel was divided in the dead subject, by cutting upwards and outwards, and never by directing the incision towards the linea alba. It is very clear, that these observations can only apply to the healthy state of the parts. CAMPER‡ has noticed the change of situation which this vessel undergoes in inguinal her-

* LANGENBECK, tab. xxiv

† *Traité des Hernies*, p. 123.

‡ *Demonst. Anat. Pathol.* lib. ii, p. 5.

nia:—"In herniis igitur inguinalibus, arteria et vena epigastica versus pubem a prolapsis intestinis compelluntur." CHOPART and DESAULT not only knew the ordinary situation of the artery in bubonocoele, but were acquainted with the more uncommon case which will be presently described, in which it is found near the external angle of the ring. "Mess. CHOPART et DESAULT admettent l'artère épigastrique au côté interne de l'anneau, et rarement au côté externe dans le cas de hernie*." This statement is confirmed by the testimony of ROUGEMONT†, who adduces his own experience on the subject, and rightly adds, that when the artery is on the outside of the ring, the spermatic cord is situated on the outside of the hernial sac. The variation in the course of the vessel is also correctly stated by SABATIER‡. The truth of the opinions entertained by CAMPER, DESAULT, ROUGEMONT, and SABATIER, is fully confirmed by the more ample experience and extensive researches of COOPER and SCARPA, with whose description those of HESSELBACH and CLOQUET entirely coincide.

A person, who is not well acquainted with the anatomy of the abdominal muscles, will find a difficulty in understanding the preceding account. A clear notion of the subject cannot be conveyed by mere verbal description, to a person previously un-

* ROUGEMONT, in a note to his translation of RICHTER, p. 124

† Ibid. p, 124.

‡ *Médecine opératoire*, tom. i, p. 92.

acquainted with it. In order to acquire a satisfactory knowledge of the parts, a careful investigation of them, both in their healthy and diseased state, must be combined with a reference to the best plates and descriptions. It may, however, facilitate the progress of a beginner, to enumerate the parts as they are met with successively, in dissecting a hernia from the surface downwards.

The removal of the integuments exposes the exterior investment of the hernial tumour continuous with the margin of the ring, and formed of tendinous fibres from the aponeurosis, the cremaster muscle, &c. This is connected by cellular substance to the proper hernial sac formed of the peritoneum. When the aponeurosis of the external oblique has been detached from the crural arch, in the manner described in the first section of this chapter, this production of peritoneum is seen passing through the lower opening of the canal, and then continued upwards and outwards. Behind and above the ring, the inferior margin of the obliquus internus and transversus crosses the neck of the sac. When these muscles are reflected towards the linea alba, the fascia ascending from Poupart's ligament, and forming the upper opening of the inguinal canal, is exposed, and the epigastric artery is discovered, emerging from the inner side of the hernial sac*, which, at this precise point, becomes continuous with the peritoneum lining the abdomen. The re-

* CAMPERI, *Icones*, tab. x. F. M.

moval of the hernial sac will disclose the course of the spermatic cord in its descent towards the testicle; and when this is also elevated, the first part of the course of the epigastric artery, and its origin from the iliac trunk, are exposed*.

In the species of bubonocoele now described, the cause of strangulation may exist in the upper aperture of the inguinal canal, or in the lower aperture, or in the neck of the sac. According to Sir A. COOPER †, the first is most frequent in recent and small herniæ, the second in old and large ruptures. The stricture may occur in the upper orifice, where the parts have passed the ring completely, the tendon of the obliquus externus remaining loose and free: a rupture may also be strangulated by both openings at once.

The strangulation in the upper opening probably constitutes the case, which surgeons have generally described as arising from a stricture in the neck of the sac. That the parts, forming this opening, may produce a state of incarceration is easily understood; but a soft and extensile membrane, like the peritoneum, which yields to any impelling or distending force, cannot form a stricture on the prolapsed viscera, unless it should have been previously thickened and indurated. BERTRANDI ‡ directly

* The work of CAMPER exhibits these facts very clearly: see tab. v, ix, x, and xii. See also the first three plates of SCARPA.

† Page 21.

‡ *Traité des Operations*, p. 30.

asserts, that the transversus and internal oblique sometimes cause strangulation. That the instances related by others are of the same nature is rendered very probable by this circumstance, that the stricture is generally said to have been at some distance within the ring of the external oblique. In three cases which occurred to Mr. WILMER*, the stricture was more than an inch higher than the external opening of the tendon. ARNAUD† found a stricture two inches behind the ring, and LE DRAN has a similar observation‡. Mr. HEY§ was obliged to divide the ring pretty freely in order to get at the internal stricture.

* *Practical Observations on Hernia*, p. 3 and 15. In the advertisement to the second edition Mr. WILMER expresses himself very strongly as to the frequent occurrence of stricture in the situation we are now considering. "In one-third of the cases, in which the author has been obliged to have recourse to the knife, the cause of the strangulation was in the neck of the hernial sac; and he is convinced, that if the inexperienced operator considers the stricture to be found only in the tendinous openings of the abdominal muscles, many lives must be unavoidably lost. He was early led to the consideration of this subject, having seen the intestine burst by the rude efforts made to return it after the opening of the external oblique muscle had been dilated, in two cases, where the operation for strangulated hernia was performed during his attendance at the London hospitals."

† See his remarks, "*Of the Strangulation of the Intestine by the Peritoneum*," p. 353, et seq.

‡ *Observations*, p. 60.

§ *Practical Observations*, p. 174.

In the first chapter of this work I have mentioned, that a process of thickening and induration may take place in the mouth of the sac; and I have stated further, in the fifth chapter, that such a change will be promoted by the pressure of a truss. It cannot be doubted that the parts may experience stricture from this cause*, although such an occurrence is much less frequent in bubonocoele than that of strangulation from the sides of the superior aperture. Whether the neck of the sac, or the border of the opening, form the stricture in these cases, the practical observation is the same; viz. that we may very often expect to find the tendon of the external oblique quite free, while the obstacle, which prevents the return of the parts, is situated further in towards the abdomen; and that there may be a stricture in this latter situation combined with one of the former kind.

SECTION III.

External Inguinal Hernia, which does not appear through the lower opening of the Canal.

THE commencement of this species of rupture is the same with that of the preceding; viz. the pro

* Mr. WILMER says, that on passing the finger into the tendon of the external oblique, a stricture will often be found an inch higher in the neck of the hernial sac. "This stricture is annular, is sometimes thick and cartilaginous." Ed. ii, p. 41.

Sir E. HOME divided the ring of the external oblique ineffec-

trusion of the viscera, over the spermatic cord, into the inguinal canal. As they do not overcome the resistance of the lower opening, the tumour is contained in the canal. The cremaster muscle is expanded over the sac, and the whole is covered by the aponeurosis of the external oblique. The spermatic cord is behind the sac, and the epigastric artery has the same relation to its mouth as in the preceding species. The transverse and internal oblique muscles pass over its neck, behind the aponeurosis of the obliquus externus; and they cause the stricture when it is incarcerated.

Although this form of inguinal hernia has not been well understood and clearly described until lately, it has not entirely escaped observation. LE CAT* mentions two cases, where the aponeurosis of the external oblique muscle covered the tumour. PETIT† had a tolerably clear notion of the anatomy, as the following quotation will prove: “ Mais ce qui me fait croire que les hernies qui paroissent en cet endroit, ne se font pas toutes par l’anneau, c’est que j’en ai vu plusieurs situées sous l’aponevrose du grand oblique; de sorte que les parties, apres avoir poussé le peritoine au-delà du muscle transverse et de l’oblique interne, n’ayant pu forcer l’anneau de l’oblique externe, s’etoit-
tually; on opening the tumour, he found the intestine “ closely embraced by the orifice of the sac.” *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge*, vol. ii, p. 106.

* *Philos. Trans. Abridged*, vol. x, p. 221.

† *Traité des Mal. Chirurg.* tom. ii, p. 247.

ent réfléchies entre cette aponevrose et l'oblique interne, et y formoient une tumeur large et plate." CALLISEN* mentions an instance in which the rupture was of this kind; although ROUGEMONT, who notices it in the additions to his translation of RICHTER, has so totally mistaken its nature as to call it a crural hernia†.

We are indebted to Sir A. COOPER for the first clear description of this case. In the first part of his work, chapter xiv, he points out the distinguishing characters of the swelling; and he has illustrated the anatomical facts in the iiii, vth, and vith plates. "This tumour," says he, "occurs much more commonly than is usually supposed; for I have frequently found it in the dissection of bodies of persons who have never been suspected of labouring under the disease, nor ever wore a truss. When strangulated, these cases more commonly fall under the care of the physician than the surgeon; for, as the patient himself is often not conscious of having a tumour at the groin, the symptoms of strangulation

* *Acta Societatis Medicæ Havnensis*, vol. ii. The following statement is given by ROUGEMONT:—"Une petite hernie crurale recente fut sur le champ si fortement étranglée, que M. CALLISEN pratiqua l'opération. Après avoir incisé la peau, il ne trouva point de hernie sous le ligament de Fallope, mais l'aponevrose de l'oblique externe au dessus de ce ligament étoit distendue en une tumeur de la grosseur d'un œuf de pigeon. Il incisa longitudinalement, et y trouva une portion d'intestin très inflammée." *Tr. des Hernies*, p. 304, *Addition*, No. 9.

† MURRAY mentions the existence of incomplete herniæ, which have not come through the obliquus externus (p. 79); and strangulation by the transversus and obliquus internus, p. 13. *Diss. Animadversiones in Hernias Incompletas, casu singulari illustrata*

are ascribed to inflammation of the bowels, without a suspicion of the true cause having been excited*.”

The tumour is small ; for, if the protrusion increases, the parts escape readily through the lower opening of the canal. But I have lately dissected a case, in the female, which formed an exception to this rule. The aponeurosis of the obliquus externus was distended by a swelling equal in bulk to two fists, and a tumour of the size of an egg had passed through the lower opening. On turning back the tendon, it appeared that both these were parts of one hernial sac, which had been protruded at the upper opening, in the ordinary way, had increased to a large size in the canal, and had afterwards passed partially through the lower aperture†.

SECTION IV.

Internal Inguinal Hernia‡ (Ventre-Inguinal).

I HAVE explained already, that the space left above the pubes, between the two columns of the

Upsal. 1788. SCARPA also describes the small herniæ, which do not pass the ring of the obliquus externus, but are covered by its aponeurosis. M. i, § xvii.

* *Anatomy and Surgical Treatment of Inguinal and Congenital Hernia*, p. 48.

† HESSELBACH represents in his eighth plate a rupture which had penetrated the upper opening of the canal in a female, and had acquired considerable size under the aponeurosis of the obliquus externus, without passing the lower opening.

‡ SCARPA, m. i, § xxv. The situation of the opening, at which

aponeurosis of the obliquus externus, through which the spermatic cord quits the inguinal canal, is closed behind by the fascia transversalis, connected to the tendon of the transversus and obliquus internus, near its insertion in the pubes, and to the outer margin of the rectus. When the size and position of the opening in the aponeurosis are considered, we can hardly doubt, that ruptures would take place through it much more frequently, were they not prevented by this structure. Yet their formation is not entirely obviated. We have the parts protruded under the edge of the transversus, and then through the lower opening of the abdominal canal. Such ruptures occur, according to SIR A. COOPER*, “if this tendon (*viz.* that of the transversus) is unnaturally weak; or if, from malformation, it does not exist at all; or, from violence, has been broken.” I lately dissected a hernia of this species, where the fascia was neither thinner than usual, nor separated by any violence; but it had been protruded before the peritoneum, and formed a thick aponeurotic covering to the hernial sac†. In passing from its origin to the rectus muscle, the epigastric artery circumscribes externally a triangular space. The hernia protrudes, and of the epigastric artery, is clearly shown in HESSELBACH’S tab. x and xi.

* *Lib. Cit.* p. 51. SCARPA also ascribes them to weakness and flaccidity of the aponeurosis in the inguinal region; m. i, § xxv.

† “The sac of the internal inguinal hernia either pushes before it, and thus receives a covering from the fascia transversalis, or passes through an opening of that fascia.” J. CHOQUET, *Rech. Anat.* p. 83.

space, of which the crural arch is the basis, and the margin of the rectus the internal boundary. Through the lower part of this space, which is larger in proportion as the epigastric artery is farther from the pubes, the internal inguinal rupture is protruded.

Since the spermatic cord lies on the outer column of the aponeurosis of the obliquus externus, and this rupture comes directly over the pubes, the former part is placed on the outer side of the sac; more particularly at the point of protrusion. But I have seen the cord behind the sac, as in the more ordinary form of the complaint. The epigastric artery is situated on the outside of the mouth of the sac. Its course is not at all disturbed by the rupture; and it is consequently found, as in the natural state, at about three-fourths of an inch from the upper and outer extremity of the lower opening of the inguinal canal*.

Since the parts are protruded, in this case, in so different a direction from that which they pursue in the two species last described, the sac is not covered by the cremaster muscle. How often it may be in-

* COOPER, pl. vii, viii, ix, x; SCARPA, pl. i; HESSELBACH, tab. xi; LANGENBECK, tab. xvi, xvii, xviii, and xix.

HESSELBACH met with an internal inguinal hernia in a female, in whom the epigastric and the obturatrix artery arose, as they frequently do, by a common trunk from the external iliac. The epigastric separated from the common trunk at an inch from its origin, and ascended along the inner side of the mouth of the sac. P. 17.

vested by a protrusion of the fascia transversalis, I cannot hitherto determine*. Mr. STANLEY has always found it thus covered: and has placed some specimens illustrative of the fact in the museum of St. Bartholomew's Hospital.

In dissecting this species of rupture, the spermatic cord, covered by its muscle, is found at the outer side of the sac. The latter part goes directly upwards, instead of upwards and outwards. The reflection of the obliquus externus exposes the lower edge of the obliquus internus and transversus, crossing the neck of the sac immediately behind the lower aperture of the inguinal canal. By turning these aside, the continuity of the sac with the abdominal cavity is exposed just over the pubes, and the passage of the epigastric artery, at about half or three quarters of an inch on the outside of the mouth

* LANGENBECK asserts that this is the regular and constant arrangement. “*Quia hernia inguinalis interna non in canalis abdominalis aperturam internam transit, tunicam vaginalem communem intrare nequit; parietem autem canalis abdominalis internum aponeuroticum, in quo fovea inguinalis interna (the internal fossa of the peritoneum, see p. 180), et qui ex adverso annulo abdominali est, ante se per annulum trudit. Hernia tum inter obliqui interni fibras musculares, ad spinam ossis pubis transeuntes, cremasterem sita est. Illæ supra sacci hernialis collum potest sunt, et in parte ejus exteriori cremaster jacet. Atque ideo hæc hernia, ut per annulum transire possit, canalis parietem internum expellere debet, multo rarior quam externa est, et quia paries ipsi egredienti obstat, nunquam tantam quam externa, magnitudinem assequitur. Parietis interni canalis fibras separari, ut in hernia ventrali, nunquam observavi, sed cum hernialem semper ab eo obiectum inveni. Commentarius, &c.; tab. xvii, xviii and xix.*

of the sac, is brought into view. The spermatic cord has no connection with the rupture behind the tendon of the obliquus externus.

The latter part, or the edge of the obliquus internus and transversus, may be the seat of stricture in the internal inguinal hernia.

SIR A. COOPER'S work* contains the first description of this hernia, which can be deemed complete or accurate: but its existence had been noticed previously. CAMPER† seems to have met with an instance of it so early as the year 1759 and Mr. CLINE‡ dissected a case in 1777. CHOPART and DESAULT§ had probably observed frequently, as they direct the incision of the ring to be varied according to the course of the epigastric artery. ROUGEMONT|| had seen one example. It is very clearly described and delineated by SCARPA¶. The exact proportion, in point of number, between this kind of ruptures, and those of the species first described, has not been hitherto ascertained; it only appears that the latter are by far the most frequent**.

* Chapter xv.

† *Edinburgh Review*, vol. i, p. 465.

‡ COOPER, pt. i, p. 51.

§ *Traité des Mal. Chirurg.* tom. ii, p. 263.

|| RICHTER, *Tr. des Hernies*, p. 125: note.

¶ Mem. i, § xxv and xxvi; and pl. i.

** In a great number of dead bodies of persons affected with herniæ, SCARPA met with very few instances of the internal inguinal kind. M. i, § xxv. Five examples occurred to HESSBACH, in a very short time. *De Ortu et Progressu Herniarum* &c. p. 52. Mr. J. CLOQUET states the proportion of internal external-inguinal herniæ at 1 to 5. *Rech. Anat.* p. 84.

SECTION V.

Inguinal Hernia of Females.

THE inguinal hernia of females does not require a particular description, as its anatomy resembles that of the same rupture in the male subject. The round ligament of the uterus has the same relation to the swelling, as the spermatic cord in the male. The parts may be protruded through the superior aperture, and be contained in the inguinal canal: they may pass through the whole canal; or they may be protruded directly through the inferior aperture. The only instance which I have seen of the latter kind, in the female, occurred in a subject, which was brought to the anatomical theatre at St. Bartholomew's hospital, for dissection; and it was discovered by Mr. HAFFENDEN, a very intelligent and industrious student, who pointed it out to me. Another case is mentioned by HESSELBACH; see Note, p. 210.

 SECTION VI.

Inguinal Hernia, in which the fixed portion of the Cæcum or Sigmoid Flexure passes through the Ring.

THE loose parts of either of these divisions of the alimentary canal may be protruded in ruptures,

like any other of the floating viscera ; and the swelling comes under the common description in its origin, anatomy, and treatment. But the subject of the present section is the protrusion of that portion of the cœcum and neighbouring colon, on the right side of the body, of the sigmoid flexure and descending colon, on the left side, which are naturally fixed in their respective situations, *viz.* in the right and left ileo-lumbar excavations of the abdomen. These parts of the large intestine do not lie loosely in the peritoneal cavity, surrounded on all sides by a reflected covering of the membrane, like the jejunum, ileum; or transverse arch of the colon; but they are firmly bound down in the lumbar and iliac regions, and covered only partially by reflected peritoneum. Their posterior surface is connected by loose cellular tissue to the lumbar and iliac muscles, kidneys, &c.; the remainder of the tube, covered by peritoneum, appears in the cavity of the abdomen; while that membrane, passing from the sides of the gut to the neighbouring abdominal parietes, fixes it in its situation. This portion of peritoneum, like the adhering posterior surface of the intestine, is connected to the surrounding parts by means of a very copious and loose cellular tissue, which can be easily lacerated by the hand, so as to enable us to lift up altogether the peritoneal bag with its contents, and which readily yields, so as to permit the displacement of the parts without any separation of their posterior connections.

If these facts are borne in mind, the peculiarities

of the case now under consideration will be readily understood. The cœcum and the sigmoid flexure, with the neighbouring portion of peritoneum, descend, retaining their posterior and lateral connections, as the testis does in the fœtus. In its original situation under the kidney, the testis is covered on the anterior and lateral aspects by reflected peritoneum, but adheres posteriorly to the psoas muscle, by means of cellular substance; during the whole of its passage down to the abdominal ring it always presents the same appearance, always being connected behind; lastly, when it has reached the bottom of the scrotum, if we lay open the peritoneal process, which forms the tunica vaginalis, we still see the cord and testis attached posteriorly to the bag of the scrotum, as they were to the lumbar and iliac regions of the abdomen, and we see the peritoneum forming a sac or loose covering for them in front and laterally. In the same way, the hernial sac of these ruptures incloses the protruded gut only anteriorly and at the sides, and the gut itself is connected behind to the scrotum, as it was connected to its natural situation in the abdomen.

When the termination of the ileum, or the sigmoid flexure of the colon passes down, the intestine is accompanied by the mesentery or mesocolon belonging to it. These duplicatures connect the parts to the back of the sac, as they did to their natural situations in the abdomen.

This kind of descent is sometimes a secondary

occurrence, taking place in addition to a hernia of the common sort, and as a consequence of its increase. When an ordinary rupture is enlarging, the peritoneum is drawn more and more out of the abdomen, and gradually drags with it those viscera, to which it is so firmly connected. Thus the cœcum and colon are drawn in to form part of the hernial sac; when we open the latter, and turn aside its loose contents, we see the large intestine lying in the back of the sac, as it lay in the ileo-lumbar region, connected behind by loose cellular substance to the groin and scrotum, and fixed at the sides by the lateral attachments of the peritoneum. In an analogous manner the fundus of the bladder may be drawn out through the ring (see the chapter on Hernia of the Bladder).

On the other hand, when the fixed part of the large intestine has descended originally, protrusion of some loose viscera may be added to it, and occupy the bag formed between the surface of the gut and the hernial sac.

We can hardly set bounds to the extent of the displacement in these cases. I lately examined an immense oscheocele, which had nearly reached the knees; the cœcum had descended to its very bottom and the ascending colon was seen fixed to the back of the sac, as it ordinarily is to the posterior and lateral part of the abdomen. The enormous sac contained the whole omentum, jejunum, ileum, and arch of the colon.

The course of the protrusion is the same as in the

common inguinal hernia; that is, the parts descend through the inguinal canal, over the spermatic vessels, and between them and the cremaster muscle. The peritoneal sac, therefore, is covered by the tunica vaginalis communis of the cord, and by the fibres of the cremaster, as in the case of the ordinary bubonocoele.

On account of the connections, which have been already particularized, these herniæ are irreducible; unless where some of the loose viscera have passed into the sac, in which case a partial replacement may be effected.

It will be obvious, from the preceding account, that these descents must take place gradually; that the displacement of parts connected, as the cœcum and colon are, in their natural situation, must be a slow process; and consequently, that herniæ formed suddenly by any accidental cause or violent exertion cannot be of this kind. Further, as the parts which descend are bulky, a large opening is required to transmit them: hence such ruptures will probably occur when the aponeurotic parietes of the abdomen in the inguinal region are naturally weak, or where the openings have already been enlarged by previous protrusion; hence too they are little likely to become strangulated.

The treatment of these cases falls under the rules, which apply to irreducible herniæ (see the chapter on that subject); and the conduct of the surgeon, in the rare event of strangulation requiring an operation, will be regulated by the same

principles as in large and adherent herniæ (see the chapter on the operation for strangulated inguinal hernia).

These protrusions are not very rare; many examples of them are recorded, and are noticed principally on account of the embarrassments, which the unexpected adhesions of the parts presented in operations*. If the incision be made towards the side of the tumour, the intestine may be exposed where it is not covered by peritoneum; and thus the rupture may be supposed to have no hernial sac. This idea might very easily arise in such a case as that related by SCARPA†; where the intestine had turned on its axis, so as to present the cellular adherent surface, which is naturally posterior, towards the front of the scrotum. Indeed, in such a case, the intestine might, at the commencement of the protrusion, be really without a sac.

Although the descent of these portions of large intestine has been noticed by several surgeons, they have spoken of it only incidentally and in detached

* ARNAUD, *Dissertation on Hernias*, pt. ii, obs. xvii; PETIT, *Mem. de Acad. de Chirurg.* tom. iv, p. 316; and *Traité des Malad. Chirurg.* tom. ii, p. 352; POTT's *Works*, vol. ii, p. 61; MONTTEGGIA, *Fascicul. Pathol.* p. 91, et seq.

† Mem. ii, § xxxiv. CHOPART and DESAULT speak of having found the cœcum, *uncovered by peritoneum*, under the integuments of the scrotum. *Tr. des Mal. Chirurg.* tom. ii, p. 195. And, on similar grounds, a writer in the *Journal general de Medecine*, par SEDILLOT, speaks of enteroceles that have no sac. Tom. xvi, p. 302.

cases. SCARPA * has entered into the consideration of the subject at great length, and has explained it very fully and satisfactorily; indeed, with rather more prolixity and repetition than were necessary. PELLETAN, who had seen many cases, also explains the occurrence rightly †; and the same remark applies to HESSELBACH ‡, and J. CLOQUET §.

SECTION VII.

Several Herniæ existing together.

INTERNAL and external inguinal hernia may co-exist on the same side; and these two may occur in conjunction with femoral hernia of the same side.

* Mem. ii, § xxix — xli. ; and pl. vi, fig. i. ii, and iii.

† *Clinique Chirurgicale*, tom. iii, p. 350.

‡ “ In herniis scrotalibus si forte cæcum dextro, colon vero sinistro latere inveniatur, utrumque intestinum parieti sacci hernialis postico proxime atque firmissime insidet; neque tamen coalitum putes, sed conformatio potius naturalis habenda. Processus nempe peritonei breviores, qui colon simulque intestinum cæcum parieti cavitatis abdominis postico arcte adnectunt, intestinorum delapsu haud prolongantur, sed ipsum adeo peritoneum, laxè musculis iliacis internis adherens, cum ipsis hisce processibus intestinorum sacco herniali contentorum pondere, eorumque vi extendente per canalem inguinalem detrahatur, atque in parietem sacci hernialis posticum efformatur. Herniæ ejusmodi intestina naturaliter conjuncta continentes repositionem haud facile admittunt, atque sub herniotomia separationem vetant. *De ortu et Progressu Herniarum*, &c. p. 34.

§ *Rech. sur les Causes et l'Anat. des H. Abd.* p. 109 — 112.

Cases are recorded, in which a common inguinal and a congenital hernia have existed together on the same side. The complication is probably very rare. Mr. WILMER mentions an instance in which the operation was performed, and a portion of intestine replaced from the tunica vaginalis. The symptoms of strangulation continuing, the man died : and another sac, containing a mortified portion of intestine, was found in the same ring*.

Persons not unfrequently have two or more ruptures : the proportion of such cases, and the particular combinations, will appear from the report of patients relieved by the city of London Truss Society ; see note chap. i, sect. ii. In a patient examined by SIR A. COOPER †, who had laboured under complaints, accompanied with difficulty in voiding the water, three protrusions had taken place in each inguinal region, and all of them on the inside of the epigastric artery. In another person, who had three ruptures, with symptoms of strangulation, there was embarrassment in the treatment of the case ‡.

* *Pract. Obs. on Hernia*, p. 104. Besides ARNAUD, who had witnessed such occurrences (*Mem. de Chirurg.* tom. ii, p. 603), the following references are made by SCARPA, who had not seen it himself ; SANDIFORT ; BRUGNONE *Diss. de Test. Posit.* § xliv ; RICHTER, *Chirurg. Biblioth.* tom. vii, p. 591.

† *On Inguinal and Congenital Hernia*. pl. x.

‡ *Ibid*, p. 27.

CHAPTER X.

SYMPTOMS AND DIAGNOSIS OF INGUINAL RUPTURES.

THIS complaint is much more frequent in the male, than in the female sex. Its occurrence indeed, in the latter, is comparatively rare; while it has been calculated that more than two-thirds of all the ruptured males have this kind of descent. The greater dimensions of the ring in the male subject account satisfactorily for this difference.

It is observed more frequently on the right than on the left side; and the difference has been ascribed to the employment of the right arm in cases which require the greatest exertion of strength and activity*. (See page 33.)

* “ En fait de hernies inguinales, il y en a un tiers de plus du côté droit que du côté gauche; sans doute à cause des mouvemens plus violens du bras droit. Il n'en est pas de même des hernies crurales, dont la différence du côté gauche ou droit n'est pas si sensible.” JUVILLE, *Tr. des Bandages Herniaires*, p. 22.

Of one hundred and forty-two ruptured persons in the Hôtel des Invalides, SABATIER found that forty-four had ruptures on both sides; fifty-five on the right, and forty-three on the left only. *Acad. de Chir.* tom. v, p. 836.

According to RICHTER and SABATIER, inguinal epiplocele is most frequent on the left side, in consequence of the omentum hanging lower on that side. *Traité des Hernies*, p. 200; *Médecine Opératoire*, tom. i, p. 135.

SECTION I.

Symptoms of Inguinal Hernia.

THE inguinal hernia possesses the common symptoms which have been mentioned in the general description of the complaint. The additional circumstances, which bestow a distinctive character on this particular species, are derived from the situation of the swelling. The tumour is either confined to the groin, or extends from the abdominal ring to various distances in the scrotum. It is first perceived in the groin, and descends gradually in front of the spermatic cord. The testicle may be felt below or behind the swelling, and the spermatic cord can sometimes be traced at the back of the tumour. It always appears to extend into the ring, and is hence distinguished from most other affections of these parts.

The rupture assumes a very different appearance, when it is contained in the inguinal canal. The tumour in such a case is always very small, inso-much that the patient himself may not be aware of its existence ; and the circumstance of its being covered by the aponeurosis of the obliquus externus renders the margin undefined, and the case still more obscure. The swelling is placed just above the crural arch, and externally to the lower opening of the inguinal canal. These circumstances should induce us to examine the groin very attentively in cases where the symptoms lead to the suspicion of a

hernia, and not to be contented with the patient's own account. SIR A. COOPER* gives us an instance, in which a woman, with all the symptoms of inflammation of the bowels, frequent vomiting and constipation, denied the existence of any swelling at the groin or navel. Yet a small inguinal rupture was discovered after death. I have seen a small intestinal protrusion discovered after death, where neither the patient knew of its existence, nor had the surgeon, who had examined the inguinal region most attentively, been able to detect it.

The appearances of the swelling will not always enable the surgeon to distinguish the internal from the more ordinary or external species of the complaint: and this is the less to be regretted, as no practical benefit could be derived from such a distinction. If we observe the tumour passing directly upwards into the abdomen, over the pubes, and can ascertain that the spermatic cord is on the outer side of the rupture, we may judge that it is an internal inguinal case. SIR A. COOPER observes, that these do not increase to that size which the ordinary cases frequently attain: all the instances, which I have seen, have been comparatively small.

* Part i, p. 56.

SECTION II.

Diagnosis.

AN attentive examination of the origin, progress, and symptoms of the complaint will enable us to distinguish a rupture from diseases of the cord or testis.

If we see a swelling of the scrotum uniform on its surface, which commenced below, and gradually ascended; if we cannot feel the testicle, but are able to discern the spermatic cord of its natural size, and in a healthy state, above the tumour; and particularly if we can distinguish a fluctuation, or discover a degree of transparency in it, we are confident that such swelling is caused by an effusion of fluid into the cavity of the tunica vaginalis testis. We conclude that the complaint is a rupture, when the swelling began at the ring, and gradually descended; when the spermatic cord cannot be felt, but the testicle may be distinguished; and when the symptoms described above, as belonging to a rupture, exist at the same time.

A hydrocele sometimes extends as high as the ring, the swelling at the same time being so tense that no fluctuation can be perceived. The origin of the tumour below, and its gradual ascent; its being constantly of the same size; and the impossibility of distinguishing the testicle, show that the case is a hydrocele. The uniform surface of the swelling, and the partial passage of light through

it, when a candle is held close, are further proofs of the same point: but, in a congenital rupture, the testis cannot be distinguished, as it is enclosed in the same bag with the protruded viscera. Here the continuation of the swelling into the ring, the variations in the size of the tumour, according to the position of the patient's body, its origin from above, and the impulse occasioned by coughing, will point out the existence of a protrusion. If the swelling has commenced below, and is invariable in its size; and if no impulse is felt on coughing, it is a hydrocele. Rare instances have been observed, in which fluid was collected in the cellular substance of the spermatic cord: and they have been designated by the name of hydrocele of the spermatic cord. Here the swelling extends into the ring, and the position of the body affects its bulk, which may be partly diminished by pressure towards the ring. The origin of the tumour below leads to the distinction*. If it had been reduced in size by pressure, and enlarged again while the hand was still applied to the ring, that would be sufficient proof that it was not a rupture.

The spermatic cord may be the seat of collections of fat, as well as of watery fluid. We sometimes see a small mass near the ring, in the dead body; and, in consequence of the looseness of the surrounding tissue, it may pass back into the ring,

* SCARPA states, that it is extremely difficult, and often almost impossible, to distinguish an omental hernia from a case of this kind, which he calls *Hydrocele par Infiltration*, m. i, § xxxi.

and come down again: PELLETTAN* has noticed this occurrence, which had been observed by MORGAGNI, under the name of "Hernie graisseuse." He saw a case, where the mass was equal in size to four fingers, and this was accompanied by a small empty peritoneal protrusion. In the instances, which have occurred to my notice, the latter circumstance has not been present. These accumulations of fat can produce no inconvenience, indeed no symptom except swelling. They are not matter of complaint, and it is therefore unnecessary to give any formal marks of distinction between them and ruptures.

If the tunica vaginalis communicates with the abdomen, the tumour can be returned; and descends again, when the pressure is removed. The feeling of fluctuation, the transparency of the swelling, and the absence of the peculiar signs of hernia, show that the case is a hydrocele.

The want of connection with the abdomen; the fluctuation, the invariable size, and the uniform surface of the tumour, distinguish a watery cyst in the spermatic cord from a rupture.

The sensation, which the convoluted and distended veins of a varicous spermatic cord impart to the fingers of the examiner, is so characteristic, that a person, who has once felt it, can hardly mistake cirsocele for hernia. But this observation, which is true concerning the recent form of the disease, does not hold good invariably; and the most

* *Clinique Chirurgicale*, tom. iii, p, 33.

experienced surgeons have confessed the difficulty of distinguishing in some cases between an omental hernia and a varicous state of the spermatic veins. A large and old cirsocele is soft and doughy to the feel, and, like an omental hernia, extends into the ring itself, which may be enlarged from this cause. It increases when the patient coughs, holds his breath, or remains long in the erect position: and is lessened by the recumbent posture, or even in some degree by pressure. Notwithstanding this resemblance between the two complaints, an attention to the following circumstances will enable us to distinguish them. The cirsocele begins at the lower part of the scrotum, and rises towards the ring in proportion as it grows larger. The commencement and progress of an epiplocele are just the reverse of these. The augmentation and diminution of a cirsocele, under the circumstances just pointed out, are very gradual; and we cannot ascertain, by applying the hand to the ring, that any thing passes into or out of the abdomen. The testis in this complaint is often diminished in size.

Sir A. COOPER recommends the following mode of distinguishing the two complaints, in case of doubt. Let the patient be placed in a recumbent position, and have the swelling reduced. The surgeon presses on the ring with his finger, and allows him to rise. The pressure is sufficiently forcible to prevent any of the viscera from falling down, but not to stop the passage of blood through the spermatic artery. If the tumour should reappear while this pressure is kept up, the case is a cirsocele.

The absence of the testis from the scrotum, together with the peculiar sensation excited by pressing the tumour, sufficiently discriminate the case of a testicle on its descent. When this organ is placed in the groin, it may, in some cases, be pushed partially into the ring, and it afterwards descends. The application of a truss would probably occasion such pain as to discover the nature of the case, even if the absence of the part from the scrotum had not been perceived.

Scrotal hernia may be combined with any affection of the cord or testis; and such a complication renders the diagnosis more difficult*. If we can return the protruded parts, the nature of the other disorder will be more easily determined: and the history of the case will probably assist in elucidating the subject.

Since the round ligament is not liable to those disorders which attack the spermatic cord and testis, the diagnosis of inguinal hernia, when it occurs in the female, is not so obscure and difficult as in the male. It may be mistaken for crural hernia, as I shall explain in the chapter on that subject. The ascent of the uterus occasions it to disappear during pregnancy.

* Scrotal hernia with hydrocele of the spermatic cord. The rupture from this complication was pushed forwards remarkably. It was operated on, in consequence of strangulation. After returning the intestine, the tumour behind was punctured; some fluid escaped, and “on aperçut dans le fond du kyste une substance vésiculaire, gélatineuse, qui fut soulevée avec des pinces, et emportée d’un coup de ciseaux.” SCARPA, p. 196.

CHAPTER XI.

OPERATION FOR STRANGULATED INGUINAL HERNIA.

THE operation for bubonocoele, as indeed for any other species of rupture, consists of the following parts: incision of the integuments; dissecting down to the sac, and opening it; removing the stricture; and replacing the protruded viscera. The following account applies particularly to the first species of inguinal hernia; and the points of difference in the other kinds will be noticed subsequently.

The instruments necessary for this operation are a common and a double-edged scalpel, dissecting forceps, probe, silver director, a short curved steel director with a deep groove, and a probe-pointed curved bistoury fixed in its handle. An instrument of the latter kind, cutting for a short space only near its extremity, is sometimes used. If to these we add curved needles armed with ligatures, adhesive plaster, lint, spermaceti or other mild cerate, linen for compresses, a long bandage, and two pieces of soft sponge, we shall be provided with all that can be required in any cases. It is not to be understood that this apparatus is indispensable; a surgeon might, on an emergency, operate with his pocket-case of instruments.

SECTION I.

Exposing and opening the Hernial Sac.

THE patient should be placed in the attitude directed for the taxis, or as nearly so as circumstances will admit: the pelvis should be at least as high as the rest of the trunk. He should lie on the right side of the bed, for the more convenient access of the surgeon. He might lie across the bed, or at the foot, with the lower extremities over the side or the end, and supported on a chair. The position must often be determined by the size of the bed, and of the apartment, and the direction of the light, rather than by any general rules. The thigh of the affected side should be maintained in the bent position, and gently turned inwards. The hair must be shaved off from the tumour and surrounding parts. The operator, being seated by the side of the patient, or between the lower extremities, makes his external incision, which should begin an inch above the external angle of the ring, and extend over the middle of the tumour, to its lower part, if the rupture be small, or of moderate size: in large tumours, it will be sufficient to divide the skin of the upper half or two-thirds. By beginning the incision above the ring he gains room where it is much needed in a subsequent part of the operation; *viz.* the division of the stricture: and for the same reason he should cut through the cellular and adipous substance in this situation, so

as to expose fairly the aponeurosis of the obliquus externus. This cut may be either performed by a stroke of the knife, or, as some prefer, by pinching up the integuments, and dividing the fold with a double-edged scalpel. In the latter case the incision generally requires to be enlarged in both directions. The single cut is accomplished with less pain to the patient, and has the appearance of greater adroitness. In executing this incision, or in the subsequent dissection down to the sac, the external pudic* branch of the femoral artery may be divided, and afford a sufficient hemorrhage to induce us to secure it before we proceed.

The cellular substance, intervening between the skin and hernial sac and the external investment of the latter, should be carefully divided, layer by layer, with the knife and dissecting forceps. An operator, who is not well acquainted with the anatomical structure, may conceive that he has opened the sac itself, when he has divided the outer covering only, where that is close and firm in its texture. To avoid all risk of cutting through the sac, and wounding the prolapsed parts, each successive layer may be elevated with the forceps, and divided with the knife inclined somewhat towards the horizontal direction : this precaution should be more particularly observed as we approach the sac. It is sufficient to dissect down in this way at one part : the opening in the sac may be made by elevating it with

* The origin and course of the vessel may be seen in CAMPER'S xiiiith plate.

the forceps, and dividing the apex of the elevated portion with the knife held horizontally ; or we may use the finger and thumb, pinching up the membrane between them, and rubbing them together in order to ascertain that none of the protruded parts are included. The aperture should be enlarged in both directions with the probe-pointed bistoury, guided by the finger or director, until the whole cavity is laid open, or at least as far as the extent of the external incision. The sac generally contains a small quantity of fluid*, the discharge of which shows that the cavity is penetrated. As this fluid is not always present, the surgeon cannot depend entirely on its appearance, as indicating that the cavity is opened.

The blood vessels of the intestine, and its smooth polished surface, distinguish it from the hernial sac, which has not those vessels, which is rather rough and cellular on its surface, and which is always connected to the surrounding parts, although these adhesions in a very recent case may be but slight.

The operator must remember, that, when the sac

* The fluid of the hernial sac is sometimes accumulated in a very large quantity. SCHMUCKER has seen a quart of water in a rupture (*Vermischte Chirurg. Schriften*, vol. ii, p. 55). Mr. POTT has often found so large a collection in old omental herniæ, that it was necessary to puncture them for its discharge (*Works*, vol. ii, p. 39). MONRO removed six pints from an old scrotal rupture, to the great relief of his patient (*Edinburgh Essays*, vol. v, p. 259). In a large strangulated scrotal hernia of uniform surface, like that of a hydrocele, SCARPA found on the operation three pints of fluid. The tumour had existed, of the

is opened, a probe or the finger will pass freely in any direction within its cavity *: the division of the exterior investment often leads him to suppose that he has cut into the true hernial sac. Many surgeons are accustomed to make great use of the probe in this part of the operation: they thrust the blunt end of the instrument into the cellular substance, and divide with the knife what they have thus raised. This practice carries with it a great appearance of roughness and awkwardness, and is a much less convenient and speedy way of accomplishing the intended object, than the method which I have described.

The occasional variations in the course of the spermatic vessels and vas deferens should lead us to proceed very carefully in exposing the sac, particularly in large bubonocèles, that we may avoid all risk of wounding them. The practice of dividing the integuments and hernial sac separately, of dissecting the intervening substance cautiously, and of not extending the incision to the lower half or third of the tumour in large ruptures, will protect these vessels from danger. The plan, which has been recommended, of making a small cut in the skin, of opening the cavity of the tumour, and then carrying the incision through the rest of the

size of a hen's egg, for eight years, and suddenly enlarged from hard riding, in which the truss broke. P. 198.

* The accidental circumstance of adhesions between the investing membrane and the contained parts hardly deserves to be mentioned as an exception to this observation.

skin and hernial sac at once, would certainly expose them to considerable risk. Mr. HEY * divided the vas deferens in this manner †.

SECTION II.

Incision of the Stricture.

THE contents of the hernia, being thus exposed, may sometimes be returned into the abdomen, without dividing the ring; and they should be so replaced, if it can be done without force. When this cannot be accomplished, the finger should be introduced gently into the neck of the sac, in order to ascertain the seat of the stricture. The incision of this should be accomplished by a curved probe-pointed bistoury † guided by the finger of the operator, which will guard the protruded parts: should the tightness of the contraction exclude the em-

* *Practical Obs.* p. 146.

† SCARPA advises that the incision of the skin should be made exactly in the middle of the tumour in large herniæ, where we may expect the component parts of the cord to be separated. He also recommends, that the division should not be carried downwards to the bottom of the sac. M. ii, § ii.

‡ The operator generally employs the crooked knife, which is contained in his pocket case of instruments; the blade of which is moveable on the handle. It would be much more convenient for operating on herniæ, to have one with a fixed blade, or, at all events, one of that construction in which the blade becomes fixed when the knife is opened.

ployment of the finger, its place may be supplied by a grooved director, the protruded parts being at the same time carefully drawn aside by the assistant, to avoid all risk of wounding them. The finger should be carried as far into the neck of the sac as it can be without violence, and between the protruded parts and the upper margin of the stricture. The bistoury, with its back resting on the finger, is pushed forwards towards the abdomen, followed and supported by the finger, which protects the viscera.

The length of the incision should not exceed what is sufficient to allow the viscera to be replaced with ease*.

The proximity of the epigastric artery to the mouth of the sac renders the direction of the incision a matter of considerable importance; while the various opinions concerning the course of the vessel have led to a corresponding difference in the directions for executing this part of the operation.

* A French surgeon proposed to dilate, instead of cutting the stricture. He employed, for this purpose, an instrument composed of two blades, united like those of scissars, and forming, when closed, a concavity on one surface, and a smooth convexity on the other. It was introduced into the ring in this state, with the concavity towards the protruded parts; and the blades were then expanded so as to produce a sufficient dilatation; LE BLANC, *Nouvelle Méthode d'operer les Hernies*, &c. 8vo. Paris, 1768: and *Refutation de quelques objections*, &c. 1769. The method is also described in his *Operations de Chirurgie*, tom. ii.

The difficulty and danger of cutting the stricture, and the fear

The practitioners of this country have generally followed the advice of SHARP* and POTT†, who direct the knife to be carried upwards and outwards, *i. e.* towards the spine of the ileum; and there is no danger of injuring the vessel by cutting in this direction, in the external, which constitute the greatest number of inguinal ruptures. But it would be endangered in the internal, where the hernia descends on the inner side of the artery; although even here the vessel is situated at such a distance from the external angle of the ring, that the return of the parts can seldom require so large an incision as to expose it to danger ‡.

Those surgeons, who have supposed that the artery has the same relation to the abdominal ring in the diseased as in the natural state of parts, di-

of weakening the parts by the incision, were the chief circumstances which led LE BLANC to adopt the plan of dilatation. It has not, I believe, been practised in this country. Indeed, if there is sufficient room to introduce a dilator, it is reasonable to expect that the parts may be replaced.

Several instruments have been contrived for the purpose of dividing the ring: such are the winged director of MERY, with two lateral processes to guard the protruded parts; the scissars of MORAND, the bistouri herniaire of LE DRAN, &c., all which may be seen in the xxivth plate of HEISTER'S *Institutiones*. These devices are so decidedly inferior to the blunt-ended bistoury, guided by the finger, that they are now nearly forgotten.

* *Critical Inquiry*, p. 29.

† *Works*, vol. ii, p. 106.

‡ That the direction of the incision towards the spine of the ilium does not necessarily endanger the epigastric artery, when this vessel takes its course along the outer side of the hernial

rect the incision to be made in a course precisely opposite to that above mentioned. RICHTER* and BERTRANDI† carry the knife upwards and inwards, or towards the umbilicus: their advice might be followed in internal inguinal herniæ, where the artery is on the outside of the rupture; but would be highly dangerous in the common case, where it runs along the inner margin of the mouth of the sac. The danger increases in proportion as the incision approaches to a course directly inwards; and the vessel must inevitably be cut if the knife were guided horizontally towards the linea alba. CHOPART and DESAULT‡ vary the direction of their incision according to the actual variation in the position of the artery: thus, they divide the tendon upwards and outwards, when the spermatic cord is behind, or on the inside of the sac; upwards and inwards, when it is before, or on the outside of

sac, is satisfactorily proved by a case, which I have related in a subsequent part of this chapter. We are, indeed, justified in concluding, that the artery has often escaped under these circumstances, when we consider that it has been, and still is the general practice, to cut the tendon upwards and outwards, and yet that a wound of the vessel seems to be a most rare occurrence. Mr. POTT must have performed the operation for the strangulated bubonocoele a vast number of times; yet no instance of a division of the artery is recorded in his works; nor did he, as I have been informed by a gentleman who heard them, mention any such case in his lectures.

* *Traité des Hernies*, p. 123.

† *Traité des Operations*, p. 29.

‡ *Traité des Maladies Chirurgicales*, tom. ii, p. 263.

the hernia*. The artery can never be exposed to the slightest risk, if this direction be followed. We cannot, however, always ascertain sufficiently the nature of the case; the distinguishing marks of the two kinds of rupture are not laid down with sufficient accuracy, to enable practitioners in general to decide upon the subject. Nor indeed does the case seem to me to admit of such a diagnosis. A common case of scrotal hernia, in which the upper opening, from the duration of the complaint, has been brought opposite to the lower one, cannot be distinguished by external examination from that species, in which the viscera protrude directly from the abdomen. The spermatic cord cannot be felt, and if it could, its position could not be relied on as an indication of the course of the hernia. In case of doubt, ROUGEMONT† directs us to divide the ring directly up-

* Although it will hold good, as a general observation, that the spermatic cord passes behind the hernial sac in the common species of inguinal rupture, and on the outer side of this part in the less frequent kind; the vessel does not invariably follow these directions; I have seen it directly behind the sac in a case of the latter description; and the varieties in its course, enumerated in sect. ii of chap. ix, prove satisfactorily, that we cannot regulate our mode of executing this part of the operation by the position of the spermatic cord.

† “ Je crois d’après cela, qu’il est permis de croire qu’on court moins de risque de léser l’artère épigastrique en incisant en haut et en dehors, qu’en incisant en haut et en dedans; que pour reconnoître exactement la disposition de cette artère. il faut s’assurer de la position du cordon spermatique relativement

wards, *i. e.* in a course parallel to the *linea alba*, as the artery can never be endangered by cutting in that direction. Sir A. COOPER adopts this practice of ROUGEMONT, and follows it in all cases; very rightly considering, that a multiplicity of directions, adapted to various circumstances, might confuse those, who are but imperfectly acquainted with the structure and relative position of the parts; and that, on this account, it is desirable to lay down a general rule, which may be followed without danger in every instance of inguinal rupture. The precise point, at which the incision of the tendon should be made, is at the middle of the superior margin of the ring; the artery can never be situated at this part, nor be exposed to danger, un-

au sac: et supposé que cela soit impossible, il faut inciser au milieu du bord supérieur de l'anneau."—Note to RICHTER, p. 125.

PETIT divided the stricture directly upwards in the bubonocoele. Having placed the edge of his instrument against the upper angle of the wound, he says, "Je le pousse en dedans, en appuyant le tranchant vers le haut." T. ii, p. 367.

SCARPA'S anatomical knowledge led him to find out, that the right direction for the incision of the ring was upwards, parallel to the *linea alba*. "J'ai opéré d'après la méthode, que je conseille, plusieurs cadavres qui avoient des hernies inguinales, soit externes, soit internes, en dirigeant mon incision le long d'un fil, qui, partant de la partie supérieure de l'anneau, étoit tendu parallèlement à la ligne blanche: chez tous, j'ai constamment laissé l'artère épigastrique intacte, lors même que je prolongeois l'incision d'environ un pouce au-dessus de l'anneau inguinal." M. ii, sect. v.

less the incision be extended to a most unreasonable length.

When the stricture is in the superior orifice of the ring, the epigastric artery is invariably found on the inner margin of the aperture; and cannot therefore be injured by carrying the incision towards the spine of the ilium; nor does the practice of cutting directly upwards expose it to any risk. The instruments to be employed in dividing the stricture, and the manner of using them, are nearly the same as when the tendon of the external oblique causes the incarceration. The bistoury recommended by Sir A. COOPER, which has a cutting edge extending only to a certain distance from the point, may be employed for this purpose. It must be introduced with the flat side towards the finger, until the probe point has passed under the stricture, when it should be turned up so as to bring its edge in contact with the margin of the transversus, and to divide that muscle to the required extent.

The protruded parts may be strangulated, both in the upper and lower openings, at the same time, so as to require an incision in both these situations for their complete liberation. Hence the division of the tendon of the external oblique does not always set the parts free; and the surgeon should in every instance pass his finger in the direction of the ring, to ascertain whether any further stricture remains to be divided.

If the incarceration be caused by the upper opening only, there can be no necessity for enlarging the ring of the external oblique; unless it should so confine the finger of the operator that he cannot reach the stricture. This circumstance can hardly happen, when the incision of the integuments has been begun sufficiently high: yet it did take place in the case which I now proceed to relate; and of which I am induced to mention the particulars, because they are interesting in several points of view.

CASE.

A MAN about fifty years of age had been subject for many years to a rupture, which could be returned without difficulty. Constipation took place on the 24th of January, 1806, and, as it could not be removed, he was brought to St. Bartholomew's hospital on the 30th of the same month. His belly was distended, but not painful; and a slight degree of sickness was present. About half way between the ring and scrotum he had a soft and somewhat elastic tumour of the size of a pigeon's egg, which bore pressure without causing pain. The ring of the external oblique was perfectly free from tension; there was no testicle on that side of the scrotum. Strong cathartics and tobacco clysters having failed in procuring any relief, the operation was performed on the seventh day from the strangulation. The tumour consisted of a hernial

sac full of fluid; when this had been laid open up to the external oblique, the operator discovered that a piece of intestine was strangulated in the internal aperture. He could just reach this with his finger; but he was obliged to divide the lower ring extensively, before he could remove the stricture of the upper opening: this was at last effected, and the intestine returned. No blood was shed during the operation. Mild and stronger purgatives and clysters were all equally ineffectual in removing the constipation, and the patient died on the following evening. The tendon of the external oblique muscle had been cut upwards and outwards for two inches: it had also been divided upwards and inwards for a space of three quarters of an inch. The latter incision, which had included the inferior margin of the obliquus internus and transversus, had completely divided the epigastric artery, at three-quarters of an inch from its origin. It did not appear that the smallest quantity of blood had escaped from the divided vessel. Within the abdomen, and just behind the ring, there was a small piece of intestine perfectly black and gangrenous, which had been strangulated by a preternatural band of adhesion, extending from the peritoneum, close to the ring, to the mesentery. The convolutions of the small intestine, exceedingly distended (to two and three inches diameter) seemed to fill the whole abdomen. They were slightly agglutinated to each other, and marked here and there with red streaks. The

lower extremity of the testis lay just in the upper opening of the ring*.

This case shows us, that strangulation may proceed to the complete mortification of the intestine, without producing any of those symptoms, which are ordinarily described as attending such a

* The state of the testis in the present case leads to some interesting remarks. The body of the gland was not more than half its usual size; the epididymis, which was very imperfect, ran for about an inch behind the hernial sac, and did not join the body of the testis. Another case of hernia, which I had the opportunity of examining through the kindness of my friend Mr. CROWTHER, presented the same appearances, viz. an imperfect body of the testis just within the ring, and an incomplete epididymis, which ran down behind the hernial sac. Both the preparations are preserved in the museum of St. Bartholomew's hospital.

Mr. J. CLOQUET met with a similar state of parts in a congenital inguinal hernia, in a subject forty years of age. The testicle was flattened and very small (atrophie), contained entirely in the inguinal canal, and projected into the hernial sac, of which it formed part. The epididymis, partially unravelled (decomposé) was an inch below the testicle, adhering to the back of the sac. *Rech. Pathol.* p. 24, note; pl. vii, fig ii and iii.

In an analogous instance, SCARPA found a small testicle within the ring. *Supplément au traité pratique*; p. 8.

These cases corroborate the opinion of Mr. HUNTER concerning the cause of the testicles not quitting the abdomen. He says upon this subject, "I am inclined to suspect, that the fault originates in the testicles themselves;" and again, "When both testicles remain through life in the belly, I believe that they are exceedingly imperfect, and incapable of performing the natural functions of those organs; and this imperfection prevents the disposition for their descent from taking place." *Remarks on the Animal Economy*, p. 16 and 18.

termination: with the production indeed of very slight inconvenience to the patient. It demonstrates the danger of cutting upwards and inwards, and it proves that the epigastric artery *may* be divided without the slightest hemorrhage ensuing from the division.

SECTION III.

Wounds of the Epigastric Artery, and other cases of Hemorrhage.

SURGICAL writers have generally stated, that a division of this vessel would be attended with a fatal hemorrhage; and the size of its trunk, together with its immediate origin from so large an artery as the external iliac, render the assertion very probable. Yet there are hardly any cases recorded, in which actual examination has proved a wound of this vessel to be the cause of death*. GUNZ† says that he heard of two instances in Paris, in which the artery had been divided. BERTRANDI‡, RICH-

* I mean in hernia. — Dr. CARMICHAEL SMITH enumerates ten cases, in which death ensued from hemorrhage in consequence of the epigastric artery, or some branch of it, being wounded in the operation of tapping. *Medical Communications*, vol. ii.

† *Obs. Anatomico-Chirurg. de Herniis.* “Quod etsi non invenio ab ullo observationum auctore commemoratum fuisse, tamen quando Parisiis eram, duo exempla herniis affectorum accepi, qui ex vulnere hujus arteriæ vitam amiserunt.”

‡ *Traité des Opérations*, p. 29.

TER* and LE BLANC† assert in general terms, that a fatal hemorrhage has ensued several times from division of the epigastric artery; and the former writer says, that he has opened the bodies of men who have died a few hours after the operation, and seen the abdomen full of blood effused from this vessel. Mr. COOPER‡ gives us an instance in which a person died from hemorrhage after the operation; and another, in which repeated bleeding brought the patient very low. In one of Mr. HEY's§ cases there was considerable bleeding, but it was stopped by the use of sponge. SCARPA witnessed a wound of the epigastric artery, in an operation performed by an able surgeon, and the expressions which he employs lead us to suppose that it was fatal||. The case, which I have just related, presents an example of the epigastric artery being completely divided, without occasioning any hemorrhage during the operation, or previously to the patient's death. I have seen another instance, in which it seems certain that this vessel must have been cut, but the fact was not ascertained.

* *Traité des Hernies*, p. 125.

† *Précis d'Opérations*, tom. ii, p. 129.

‡ Page 53.

§ Page 159.

|| "I have had the misfortune to be an eye-witness of this severe and irreparable accident supervening upon an operation performed in a dexterous manner and with the greatest facility."
English Translation by Mr. WISHART, p. 129.

CASE.

In the operation for femoral hernia the stricture was divided upwards and outwards. As the first incision did not gain sufficient room for the return of the intestine, the cut was extended in the same direction. The wound immediately filled with arterial blood, which rose again almost directly to the edges of the incision, when removed with the sponge. The mouth of the vessel could not be distinguished; while we were deliberating on the propriety of passing a needle in such a direction as would be likely to include the artery, the patient, who had lost about a pint of blood, fainted, and the bleeding ceased; nor did it come on again. This woman recovered completely.

The risk of hemorrhage in these operations is by no means so great as many writers have represented. On this point my experience and opinion coincide with those of Dr. BRESCHET, "I have heard it observed by great practitioners, by professors LALLEMENT and RICHERAND, both at the head of large hospitals, that the fear of bleeding in the operation for hernia had been much exaggerated. I have seen Professor DUPUYTREN perform a great number of these operations, and have never witnessed any unfavourable consequences resulting from the operation itself*."

* *Considérations sur la Hernie Femorale, &c. CONCOURS*, p. 129.

In addition to these circumstances I may state, that the occurrence of hemorrhage, even to a very considerable amount, after the operation, is by no means a certain proof that the epigastric artery has been wounded; and that large bleeding may occur, where examination after death does not detect a wound of any considerable vessel. These assertions will be justified by the following case.

CASE.

The operation for bubonocoele was performed on a man, at St. Bartholomew's hospital, October 18, 1806, the tenth day after strangulation. The intestine was generally adherent to the neck of the sac, and its return required but a very small division of the ring, which was made upwards and outwards. No blood was shed during the operation; hemorrhage, however, took place on the same evening, but yielded to the application of cold cloths. Symptoms of inflammation occurred in the following evening, and were not subdued till the end of four days; in which time the patient lost ninety-six ounces of blood from the arm, and had twelve leeches applied to the abdomen. On the morning of the eighth day a profuse hemorrhage took place from the wound; it consisted of arterial blood, and did not cease till two pints at least had been lost. He survived this occurrence about a week, during part of which time well-grounded hopes of his recovery were entertained. The most violent and general inflamma-

tion was found to have taken place over all the small intestines. They were throughout of a florid red colour, and coagulable lymph had been deposited in considerable quantity on the surface. The parts forming the rupture had been protruded on the inner side of the epigastric artery, which, with its accompanying veins, was at least three quarters of an inch from the point to which the incision of the ring had extended, and, of course, had not received any injury. The spermatic cord passed on the outer side of the hernial sac, but had not been wounded. It appeared that a small artery, which the epigastric sends to the spermatic cord, had been cut; but its size did not seem at all adequate to the supply of so profuse a bleeding*.

The conduct which a surgeon should pursue, in case he had divided the epigastric artery, would probably be influenced by the circumstances of the case in which the accident happened. If the extent of the hemorrhage induced an opinion that this artery had been cut, the operator should dilate the wound, and expose the orifice of the bleeding vessel, and secure it by ligature. The chance of stopping the hemorrhage will be much increased, if his knowledge of the anatomy of the parts be accurate.

* In a case of scrotal hernia, related by Mr. HOME, a hemorrhage to the amount of a pint occurred on the tenth day after the operation. *Transactions of a Society, &c.* vol. ii, p. 109. And profuse bleeding came on after the operation in an instance recorded in DUNCAN'S *Commentaries*, vol. i, p. 413.

SECTION IV.

Incision of the Tendon without including the Sac.

IN all the remarks, which I have made respecting the division of the stricture, I would have it understood, that the portion of peritoneum, which constitutes the neck of the sac, is to be included in the incision. A deviation from this, which is the usual mode of operation, has been proposed by Sir A. COOPER*. He would have the tendon only divided, being unwilling to implicate the sac in the incision, and therefore insinuates his curved bistoury between these parts. He mentions two advantages as connected with this method. The incision in the sac, being more remote from the peritoneum, will be less likely to excite inflammation in that membrane; and if the epigastric artery should be wounded, it will not bleed into the abdomen. An accurate comparative trial of both methods would be necessary in order to determine the weight of the first reason. The second circumstance cannot be a matter of any importance, if we cut in such a direction as to avoid the risk of wounding the artery.

Many circumstances present themselves as objections to this proposal. The manœuvre itself, although perhaps easy to the experienced hand of such an able anatomist as Sir A. COOPER, would be found highly difficult, if not impracticable, by the generality of surgeons. This difficulty arises from the

* Pages 28 and 30.

firm manner in which the sac and surrounding parts are connected, we might almost say consolidated to each other. The experience of RICHTER* shows, that this objection is founded in reality. He once tried to divide the ring, without cutting the sac, but he found it impracticable. If the stricture is so tight as to prevent the introduction of the finger, there must be great danger of wounding the protruded parts †.

The practice would still be not advisable, even if it could be rendered as easy as the common method of operating. Sir A. COOPER leaves an inch of the sac below the ring undivided; thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished. It would be better to follow the advice of RICHTER, and scarify the neck of the sac, in order to promote the adhesion of its sides. He has found this practice so successful in accomplishing a radical cure, that he advises its employment in every operation for strangulated hernia ‡.

The plan of removing the stricture, and returning the prolapsed parts without opening the sac at all, ought, I think, to be more frequently adopted than it has hitherto been, although it appears objectionable, as a measure of general use, in the operation for strangulated hernia. The particular cases in

* *Traité des Hernies*, p. 118.

† The intestine was wounded in an attempt of this kind recorded by PELLETAN, p. 102, tom. iii.

‡ *Traité des Hernies*, p. 191.

which this method is advisable, and the reasons on which its propriety is grounded in such instances, are considered in a subsequent part of this chapter. Although the difficulty of performing any operation should not be urged as an argument against it, if it can be proved to be attended with advantage; yet the share of anatomical knowledge, which falls to the lot of most surgeons, is not sufficient to enable them to adopt this mode of operating without danger. If the parts be adherent to each other, or to the sac, they cannot be returned without opening the latter cavity; hence this must be done at last, or else the patient will be left with an irreducible hernia, that will constantly expose him to the risk of a future strangulation*. How often does the state of the omentum require that a part of it should be removed, either because it has increased so much in size as to be irreducible, without a very extensive incision of the ring; or because it is so altered in structure, that it must necessarily perish. If, in the mode of operating, which we are now considering, a portion of this viscus should be returned into the abdomen in a gangrenous state, and slough in the cavity, it would constitute a source of most serious danger to the patient, and very probably cause a fatal termination. The consequences of returning a gangrened intestine into the abdomen must also

* MONRO mentions four cases, in which he attempted this operation; he was obliged to cut the neck of the sac in two; and adhesions prevented the return of some of the parts in the third.
Description of all the bursæ mucosæ, &c.

be considered, as this might very easily take place. It often happens that this change is not indicated by any symptoms, and that it occurs in an early stage of the complaint: it is also most frequent in small herniæ. The effusion of the contents of the intestinal canal into the abdomen, when the eschar gives way, would be attended with the most dangerous consequences. The chance of a reproduction of the hernia must be much increased by the practice of leaving the sac unopened; indeed the viscera must necessarily descend into the bag which remains in the groin ready for their reception.

The utter impracticability of the proposal for returning the sac into the abdomen with its contents, except in the most recent cases, accounts sufficiently for its never having been put in practice, and relieves me from the necessity of considering it more at large*.

* PETIT, who first proposed the division of the ring without opening the hernial sac, used to place a compress of lint on the part, after the operation; he states, that the sac has in many instances gradually returned within the ring; and that it will always do so in small or middle-sized ruptures, particularly if we push up at first as much of it as we can. See his posthumous works, *Sur les Mal. Chirnrg.* tom. ii, p. 375. GARENGEOT, in describing the proceeding of PETIT, says, that after pushing up the parts, “il entasse le sac en un petit bloc, et le met dans l'ouverture même de l'étranglement; et pardessus une petite pelotte qu'il a imaginée.” The elder MONRO adopted this view of the subject. He directs that the sac should be left entire, and pushed up into the ring, “if the disease is recent, with the sac thin, and not folded into wrinkles, or straitened where it is coming through the passages in the muscles, or grown to any other

SECTION V.

Replacement of the protruded Parts.

THE last step of the operation consists in returning the protruded parts, which, if they are sound and not adherent, may be immediately performed. The limb should always be in a bent state during this part of the operation. No change of appearance in the intestine is considered as prohibiting its replacement*, except that which accompanies actual gangrene: the conduct to be pursued in that case will be the subject of a particular chapter.

part." *Edinb. Essays*, vol. v, Art. xxi. The direction of PETIT can only be understood as extending to the pushing of the sac partially, like a plug, into the ring, and not as advising a *reduction* of it within the ring. MONRO too speaks particularly of recent cases: and they must be very recent indeed, if the sac has not become adherent to the surrounding parts. Mr. COOPER relates the case of a small inguinal hernia in the female, where the sac, with its contents, was returned opened. Pl. i, p. 49. The remarks now quoted have been considered as authorising a general practice of replacing the sac; and the cases mentioned in chap. v, sect. i, and chap. viii, sect. ii, of hernia returned in a mass, would countenance such a supposition. But a correct view of the anatomical structure strongly opposes these notions. The universal and firm adhesion of the sac to all the surrounding parts; its very close connection to the spermatic vessels; and the difficulty of detaching it, particularly in the case of varieties in the position of the cord, will always constitute insuperable objections to such a proceeding; which promises no particular advantage, even if it were easily practicable.

* Superficial wounds inadvertently inflicted during the operation have not been injurious. RICHTER, *Chirurg. Biblioth.* book iv, p. 159.

The strictured part is frequently altered in colour, and to such a degree, that we should at first be inclined to think it unsafe to return a gut so changed into the abdomen. If this alteration has not proceeded so far as mortification, experience* warrants us in replacing the part; and the following case is a further proof of the propriety of this practice. The diseased action, indicated by the altered colour of the bowel, may be expected to cease, when its exciting cause no longer exists.

CASE.

THOMAS LUCAS, a negro, was brought into St. Bartholomew's hospital, with a strangulated bubonocoele, on the morning of the 14th of January, 1807.

* The intestine successfully returned, when resembling a tamarind stone in colour; *Med. and Phys. Journal*, vol. x: of a dark brown colour; WARNER, case xxxix. More than an ell of a black brown colour replaced with a fortunate result; *Chirurg. Wahrnehm.* ii, 293. Half an ell replaced, of a colour nearer to black than brown, with subsequent recovery; ACREL, *Chirurg. Vorfalle*, b. i, p. 395. See also THEDEN, *Neue Bemerkungen*, &c. erster Theil. p. 95.

Mr. DUPUYTREN found the convolution of intestine in a crural hernia of “une couleur noire d'ébène la plus foncée,” but concluded that it was not mortified; for the texture had its natural firmness; the serous tunic could not be detached; there was no stricture nor impression at the point of strangulation; and the neighbouring part of the gut had its natural colour. He therefore replaced the part. The patient died of acute peritonitis. The gut, which had been protruded, was found still black, but without any perforation. BRESCHET, *Considérations &c. sur la Hernie Fémorale*; obs. x.

The incarceration had taken place on the preceding evening at ten o'clock. Cold applications, continued for the space of four hours, and combined with the repeated use of tobacco clysters, having proved ineffectual, the operation was performed by Sir C. BLICKE at twelve o'clock. The case proved to be an intestinal rupture; and the strictured bowel for the length of two inches was, in the whole of its diameter, of the darkest brown and almost black colour: this portion was distinguished from the sound gut by a defined line. It was returned into the abdomen; but the circumstance of the deep and extensive discolouration was considered so ^{un}favourable, that the patient was not expected to survive. Symptoms of enteritis having appeared within a few hours from the operation, sixteen ounces of blood were taken from the temporal artery*; and the bleeding was repeated soon after to the same amount. With this evacuation were combined the use of warm fomentations to the abdomen, the internal exhibition of sulphate of magnesia and manna in mint water, and clysters. On the following day thirty-six leeches were applied to the abdomen, and sixteen ounces of blood taken* from the arm. These measures subdued the inflammation; but exhausted and weakened the patient to such a degree, that a nutritious diet, together with

* The blood was drawn from this vessel in consequence of the superficial veins of the arm being so unusually small, that, although they were opened in several places on both sides, no blood flowed from them.

porter, wine, &c., were required for his support. - He had completely recovered, and left the house about the middle of March.

In order to determine whether a discoloured portion of intestine be actually mortified, we are recommended to press forward the blood contained in the veins; and, if they fill again, it is considered as a proof that the part still retains its vitality. On the contrary, if it appears that coagulation has taken place, we may infer that the part has gangrened.

The discolouration, which I now allude to, consists of a dark brown, or chocolate tint: it is probably caused by the vessels being distended with venous blood, in consequence of the pressure of the stricture. The colour of gangrene is black. In the former case the coats retain their healthy texture; in the latter they are flabby, and give way under the finger.

In gangrene there is a peculiar cadaverous odour, when the intestine is exposed. A sure criterion of mortification, says Mr. TRAVERS, may be found in that "loss of lustre, which accompanies the death of polished membranous surface, which alters the complexion of the peritoneum, as it does of the cornea*."

The ulceration of the internal tunics of the intestine, at the point compressed by the stricture, and

* *Inquiry into the Process of Nature, &c.* p. 263.

the conduct to be followed in that case will be considered in chapter xvi.

In an entero-epiplocele the operator usually returns the intestine first, which accords with the relations of the two parts in their natural situation, and is further recommended by the greater facility with which the gut passes up. The omentum, which goes back less readily, and often requires partial removal, remains for our disposal. There is however no sufficient ground for any absolute rule on this point, nor for replacing mesentery before the intestine, when the former has been protruded. The object of all our proceedings is to restore the parts to their natural situation; and every consideration will lead us to accomplish this with as little violence as possible. If distended intestine can be emptied by gentle pressure, its return will be facilitated: but, if this cannot be effected without violence, it will be right to enlarge the division of the stricture. The emptied gut should be replaced, portion by portion; beginning with one end, near the ring, and proceeding gradually to the other.

As the omentum always presents first, it generally covers the intestine from our view: hence we should unfold and carefully examine this part, which often conceals a small portion of gut; and never cut it off until such examination has been effectually made. Instances have occurred in which the omentum has formed a complete bag, including

a portion of intestine*: in such a case it must be divided sufficiently to expose the latter part. The possibility of such an occurrence must make us extremely cautious in cutting away portions of the part. The protruded omentum is often so much changed in structure as to render its removal necessary. The mode of proceeding in such a case will be considered in the chapter on omental ruptures.

The contents of a rupture often adhere to each other, or to the hernial sac. When these adhesions are recent and tender, they may admit of being lacerated by the finger; if they have acquired firmness, they should be destroyed by the knife.

The intestines seldom adhere together very strongly: the most close and intimate adhesions are those which take place between the omentum and hernial sac. The surgeon should make it a rule to destroy every preternatural connection before he returns the part†: the agglutination

* RICHTER, *Traité des Hernies*, p. 133. The two cases related by Mr. HEY seem to have been in some respects of the kind. *Pract. Obs.* p. 211 and 214.

† Mr. POTT never found the protruded parts in such a state of adhesion as to be incapable of being returned; but ARNAUD relates cases in which the adhesions could not be destroyed. *Mem. de Chirurgie*, i, p. 54. And PETIT speaks of adhesions being so firm and general, that the hernia constitutes a flesh mass, without distinction of intestine or epiploon, tom. ii, p. 277. In a small crural hernia, Mr. TAUNTON found the sac adhering so firmly to the intestine, that they could not be separated. *Philosophical Magazine*, vol. xxxvi, p. 316.

the two sides of a fold of intestine has caused a sufficient obstacle to the passage of the alimentary matter to induce a fatal termination*.

Reduction may be prevented by adhesions round the mouth of the sac; as these are not in sight, their destruction is a matter of some difficulty, and attended with danger of wounding the prolapsed viscera. This part of the operation may be facilitated by enlarging the incision both of the integuments and ring, so as to bring the adhesions into view. The precaution of introducing the finger, to ascertain that the viscera are completely disengaged, and that the ring is free, which should not be neglected in any instance, is more particularly necessary in the cases which we have now been considering.

The preceding observations do not apply to the cases described in chap. ix, sect. vi, in which the cœcum and colon have passed through the ring, and have the same lateral and posterior connections as in their natural situation. We must be contented here to remove stricture. Possibly a portion of intestine might become so attached about the ring or neck of the sac as to require a similar conduct. We should be very careful in that case to make the parts quite free from pressure, and then cover them by gently approximating the integuments. An adherent intestine, when thus left out of the belly, has gradually retired in the course of the cure: or, if a

* COOPER, p. 53.

small portion remains below the ring, it is covered by granulations, and of course adheres to the cicatrix. Cases treated in this manner, both by RICHTER* and SCARPA† have got well, not only without any unpleasant occurrence, but in the course of a very short time.

The finger should be passed in, after the replacement, to ascertain that the ring is free, and that the viscera have completely re-entered the abdominal cavity. The cases, in which the protruded viscera have been returned, still constricted by the neck of the sac‡, and others, in which they have been thrust up between the peritoneum

* LODER'S *Journal* in German, book i, p. 19. The case is quoted at length in SCARPA, m. ii, § xxviii.

† M. ii, § xxviii.

SCARPA has related another case in the second edition of his work. On opening the sac of a strangulated scrotal rupture, in a patient thirty-six years old, two livid and blackish convolutions of the ileum were found, and the cœcum, with its appendix behind them. The small intestine was returned, and the large, together with a strongly adhering portion of omentum, was left undisturbed. The appendix vermiformis, which was in great part sphacelated, gave way under handling, and a mucous liquid with fecal smell escaped. In a few days granulations arose on the intestine; a little fecal matter escaped from the appendix for some time; but ultimately the wound cicatrized, and the patient was enabled to wear a truss with a hollow pad. *Supplement au Traité Prat. des Hernies*, p. 21.

‡ Cases of this kind are mentioned in the chapter on the treatment of femoral hernia, in speaking of the operation; and are alluded to in chap. iv, sect. i, on the subject of stricture by the mouth of the sac.

and muscles*, render this precaution very necessary.

If the sac, when large and thick, seem likely to prevent the approximation of the edges of the wound, or to retard their union, its sides may be cut away; attention being always paid to avoid injuring the spermatic vessels, or vas deferens.

In conclusion, I again caution the surgeon to avoid violence in every part of the operation. He should perform the whole by means of the knife, as a clean cut wound unites much more speedily than one in which laceration or contusion has been inflicted. If there is not sufficient room for accomplishing any purpose, let the incision be enlarged † : if the tightness of the stricture precludes the employment of the finger as a guide for the knife, let a director be used; when there are adhesions, let them be destroyed by the knife. I am convinced that the wound would unite more speedily, if greater

* In a case of bubonocoele, operated on by PELLETAN, in which he had pushed the intestine beyond the ring, the patient had no stools, and soon died. The parts had been thrust between the peritoneum and muscles; probably still constricted by the mouth of the sac, though this circumstance is not mentioned. *Clinique Chirurg.* tom. iii, p. 335.

† “ I have more than once seen the intestine burst by the violence used by the operator to return it.” WILMER, p. 3.

Mr. BELL gives a representation of an intestine much injured by the forcible attempts at returning it. *Elements of Op. Surg.* pl. xi.

The intestine has been torn in an attempt to lacerate an adhesion. ARNAUD, p. 317.

attention were paid to this point. There seems to be no reason why its sides, like those of any other recent incision, should not be united by the adhesive process. Such an event is particularly desirable in the present case, since numerous facts prove the importance of obtaining a speedy union of wounds, which penetrate circumscribed cavities, in preventing the occurrence of inflammation.

It is generally necessary to retain the lips of the wound in apposition, by means of one or more points of the interrupted suture, particularly when the scrotum has been divided. In the intervals between these, they should be still further approximated by strips of sticking plaster. Moderate pressure on the neck of the sac, by means of a compress secured by the spica bandage, may promote the agglutination of its sides, and prevent any protrusion.

The patient, when laid in bed, should be directed to avoid most carefully every exertion, on account of the risk of a fresh protrusion. He should therefore lie as quietly as possible. The necessity of straining for the expulsion of the feces will be obviated by the directions given in the subsequent section, concerning the employment of laxative medicines.

It will be proper to place a small and soft pillow under the scrotum.

SECTION VI.

Treatment after the Operation.

THE management of the wound requires no particular directions: it is a simple incision through parts of no consequence in themselves, and should be treated according to the ordinary principles of surgical practice in such injuries. If the progress of the case should be favourable, the first dressings need not be removed before the fourth day; after which time the applications may be renewed every twenty-four hours. Where inflammation comes on, and the sides of the incision swell, the sutures may be removed, and a linseed or bread poultice applied in place of the adhesive straps.

As soon as the cicatrix has acquired a sufficient firmness, and before the patient leaves his bed, a truss should be applied; and it must be constantly worn after the cure. The operation only removes the immediate danger, leaving the patient still subject to a future protrusion, which indeed often takes place to a greater extent than before. Sometimes a radical cure is effected: but as this occurrence cannot be ascertained at first, it is right to adopt measures of precaution in every instance.

Evacuations per anum, and a considerable abatement of the symptoms in general, are the usual consequences of the operation. The former do not always follow immediately; and in all cases it is useful to solicit the action of the intestines by

means of common clysters, and small doses of Epsom salts dissolved in infusion of roses or mint water. There is frequently a large collection of fecal matter to be evacuated; and the operation of the purgatives cannot be otherwise than salutary, as it must diminish the tendency to inflammation. A light and sparing diet should be strictly enjoined until the complete recovery of the patient: the intestines remain for some time in such an irritable state, that the least irregularity in this respect brings on considerable disorder, and greatly impedes the progress towards recovery. Many instances have ended fatally, and great danger has arisen in others, from the injunctions of the medical attendants on this subject being disregarded.

Inflammation of the peritoneum is not an unfrequent consequence of the operation for strangulated hernia. The contents of the abdomen are often either inflamed or disposed to inflammation before the operation, and the wound of itself is sufficient to bring on peritonitis. When a tense and painful state of the abdomen, hiccough, immediate rejection of every thing which enters the stomach, and obstinate constipation indicate the occurrence of inflammation, the most active means must be employed, without delay, and must be followed up until these symptoms are subdued. We have a case of inflamed peritoneum or bowels to treat. Our chief reliance will be placed in venesection, repeated according to circumstances. Topical bleeding from the abdomen by means of leeches or cupping: warm

fomentations to the part, the warm bath, blisters, purgative medicines, and injections, must be combined with general blood-letting. Some of these latter remedies only may be sufficient in slighter cases. The patient is often reduced so low by the means employed to subdue inflammation, that it is necessary to support him afterwards by nourishing diet, by wine and cordial medicines. When the intestine has become considerably inflamed or discoloured before the operation, its replacement may not put a stop to the diseased processes caused by the stricture: the inflammatory disorder may still go on, and extend to the sound portion of the canal. The case of the negro, related in the preceding section, exemplifies this remark; it should teach us to watch the progress of the case carefully, and if the symptoms threaten inflammation, to adopt immediately the proper measures.

Sometimes inflammatory symptoms characterize the strangulation from the beginning, and lead us to operate very early. Here there cannot be much accumulation in the intestines, and we must look for inflammation, which is not confined to the protruded portion, but general*. The most active antiphlogistic treatment is necessary.

* Messrs. PELLETAN and TRAVERS relate several cases, in which the inflammation of the abdomen was not relieved by the operation, and proved fatal soon after it. In some of these there was purulent and serous effusion into the abdomen previous to the operation, evacuated by the incision, and coagulating lymph

Irritability of the stomach, and sickness remaining after the operation, may be remedied by the effervescing saline draught combined with opium. If diarrhœa come on in the course of the cure, the latter medicine with cordials deserves our greatest confidence*.

On the continuance of the symptoms of strangulation after the operation, the reader is referred to sect. ii, chap. viii.

SECTION VII.

Proceedings designed to promote the radical Cure.

It has been sometimes proposed, to combine with the operation for strangulated hernia such proceedings as appeared likely to promote a radical cure of the complaint. A ligature has been placed on the mouth of the sac, and the sac itself has been dissected away. The combination of these processes

on the protruded parts. *Clin. Chirur.* tom. iii, p. 364—375. *Inquiry.* &c. p. 222, & seq.

In the same works there are cases which exemplify very well the progress of inflammation, and the proper treatment. See *Clin. Chir.* tom. iii, p. 55; *Inquiry,* &c. p. 232.

* Dr. HULL mentions an instance in which the testis and spermatic cord sloughed after the operation, although it was not known that the artery had been divided. We can understand from the variations in the course of the cord, that it might be divided without the operator being aware of it. *Med. and Phys. Journal*, vol. xi.

was successful in two instances of irreducible but not incarcerated ruptures, operated on by SCHMUCKER*. The latter completely failed in the hands of SIR A. COOPER. The ligature, when employed by PETIT, produced such alarming symptoms, that its removal was thought proper; after which they ceased. The irritation, which a ligature may be expected to produce, in the peritoneal surface of the hernial sac, and the facility with which inflammation would be propagated, by the continuity of surface to the cavity of the abdomen, are the sources of the danger, which attends this proceeding. I have already noticed the proposal of RICHTER; that of scarifying the neck of the sac, in order to produce adhesion of its sides†. He seems to have found this successful in practice; and its performance cannot apparently be attended with the risk of any unfavourable consequence. One remark may be made on all these methods; *viz.* that they cannot operate on the cause of the complaint. The frequent return of ruptures after the operation must be ascribed chiefly to the dimensions of the ring being enlarged by the incision. This state of the parts will not be at all affected by the obliteration of the mouth of the sac. Yet it must be acknowledged, at the same time, that a recurrence of the complaint will be less probable, if the opening in the peritoneum be obliterated by adhesion, than if it still continue pervious.

* These cases have been already alluded to, p. 93.

† See section iv of this chapter.

SECTION VIII.

Mode of operating on large Herniæ.

OUR proceedings in operating on a strangulated rupture must be somewhat modified by the circumstances of the case. The operation, which has been just described, would not be advisable in a large, old, and adherent hernia. The separation of the preternatural connections is often very tedious and difficult; and the violence, which must necessarily be inflicted in executing this part of the operation, renders the subsequent occurrence of inflammation extremely probable. The extensive surface, which must be exposed by laying open the whole of a large hernial tumour, constitutes a source of great danger to the patient, who in these cases is generally advanced in years, and therefore less able to withstand an extensive inflammation and suppuration. We must remember too the fact stated in the third chapter, of the impossibility, which sometimes occurs, of keeping the returned parts in the abdomen, after they have resided for many years in a hernial sac. Moreover, the ring is so much dilated, that the hernia will certainly form again, and consequently there can be no expectation of a radical cure from the operation. These reflections will induce us to adopt the practice of removing the stricture without opening the tumour. The operation will be performed by making an incision of two or three inches in

length through the integuments over the abdominal ring. We then dissect down to the fascia, which covers the hernial sac, and make an opening in that fascia. This allows us to pass a grooved director under the tendon; and the probe-pointed bistoury may be conducted, by means of the groove, to the part that requires division. If great difficulty should be experienced in accomplishing our object in this manner, a small aperture may be made in the sac near the ring, which will enable the surgeon to divide the tendon with ease. When the parts are thus set free, they should be returned into the belly by pressure on the swelling, if adhesions do not prevent this; at all events they generally admit of being replaced in part. The sides of the incision should be carefully approximated by means of sticking plaister; and they will probably unite by the first intention: an event which could not be very reasonably expected, if the operator followed the advice of a writer, who recommends, that the skin should be *accurately stitched* by means of stitches placed at a finger's breadth from each other.

We thus accomplish the only rational object, which the performance of the operation can be expected to attain; that of rescuing the patient from the dangers attendant on the strangulated state of his rupture: and we accomplish it by a method attended with the least risk. The return of all the viscera could be effected only at the great hazard of the patient's life; and would be attended with no

corresponding advantage, as their subsequent protrusion, after a longer or shorter interval, might be anticipated with considerable confidence.

A case, which completely illustrates the foregoing observations, is related by SIR A. COOPER*. The swelling, which reached half way to the knees, had existed from infancy, and never admitted of complete replacement. The presence of a constant cough rendered it probable, that, if the parts were returned by the operation, they would be forced out again. SIR A. COOPER therefore divided the stricture without opening the sac: this enabled him to return a portion of the prolapsed viscera. The strangulation was completely relieved, and in a few days the person, who was fifty-four years of age, had perfectly recovered. The same gentleman has furnished us with an instance of the fatal effects of a different conduct. Strong and general adhesions rendered the separation and replacement of the parts, contained in a large strangulated ventral rupture, impracticable: inflammation speedily followed the exposure of the tumour, and the patient perished in thirty-seven hours†. The following case affords another proof of the advantages of the proceeding, which I have recommended in these instances. The favourable termination must be entirely ascribed to the discrimination and judgment of my late respected friend, Mr. CROWTHER, surgeon of Bridewell and Bethlem hospitals, who sug-

* Pt. i, p. 45 and 46.

† Pt. i, p. 46.

gested the mode of operating, and did me the favour of communicating the particulars.

CASE.

THE operation for strangulated hernia was required in an old and neglected scrotal rupture, which exceeded in size a quart decanter. Mr. CROWTHER, who had just perused MONRO's work on the Bursæ Mucosæ, immediately perceived that this was a case precisely adapted for the doctor's method; and accordingly advised its adoption. On making an incision down to the ring, it appeared, that the contents of the rupture were not pressed on by the tendon of the external oblique. A small opening was therefore made in the sac, in order to ascertain the state of the parts within: no sooner was the cavity penetrated, than a bloody fluid issued from the opening with considerable force; a gurgling noise was heard, and the intestine went up spontaneously. A portion of omentum, which remained behind, was reduced without difficulty, and the wound united by the first intention.

The advantages of operating without opening the hernial sac are so great in cases, where the tumour exceeds a moderate size, that I strongly recommend its adoption in all such instances.

The honour of proposing this mode of operating belongs exclusively to JEAN LOUIS PETIT; and it is merely for the purpose of performing an act of

justice to the memory of this very able surgeon that I add the few following remarks. In the first edition of his work on the Operations of Surgery, published in 1719, GARENGEOT mentions a case of crural hernia operated on by PETIT without opening the sac, in the preceding year. The latter writer recommends the method in those cases to which it is certainly most applicable, namely, large and adherent herniæ*. But he advises also its more general employment; excepting those cases only in which mortification has occurred, or the parts have become adherent, or the intestines contain a foreign body†. The object of the operation being to liberate the protruded parts from the stricture which they suffer, does not, he says, require that the sac should be opened; and he regards it as a peculiar advantage of this method, that the viscera are not exposed to the air‡. MAUCHART§, HEISTER||, SHARP¶, and others, have considered the proposal of PETIT, and not thought it deserving of

* *Tr. des Mal. Chir.* tom. ii, chap. vii, § xii. “De l’operation que l’on fait aux grosses hernies.” This posthumous work was not published until 1774; but as PETIT died in 1750, and has stated in his book that he had operated on herniæ in this way more than thirty years before, his claim to originality may be sufficiently vindicated.

† § ix.

‡ “Il est même très avantageux d’éviter cette operation (opening the sac), parce qu’on n’expose point les parties a l’air.” P. 373.

§ *Dissertatio de herniâ incarcerata*; Tubing. 1722.

|| *Institutiones Chirurgicæ*.

¶ *Critical Inquiry*.

approbation. Yet RAVATON* brings it forward as an entirely new proposition, in his *Treatise on Gunshot Wounds*, 1750; and assures us, that he had employed it in three cases with the greatest success.

The method of PETIT has met with a very zealous advocate in Dr. MONRO†; but its author is accused by this gentleman of not understanding the principles on which its utility is founded, and particularly of not knowing the very mischievous effects produced by the atmosphere coming in contact with the contents of any circumscribed cavity. The reader will be surprised at such an accusation, after he had read in PETIT, that the avoiding of such an exposure is the chief advantage of his method. I do not mention this from attaching any importance to the opinion concerning the dangerous properties of the air, but because I conceive that the French surgeon has been very unfairly treated in this business‡;

* *Traité des plaies d'armes á feu, &c.* 8vo. Paris, 1750.

“Nouvelle façon d'operer la bubonocèle.” P. 305, et seq.

† *Description of all the Bursæ Mucosæ*; or in the *Essay on Crural Hernia* of Dr. MONRO, JUN.

‡ Dr. MONRO supports his assertion concerning PETIT's ignorance of the true principles, on which the utility of his operation is founded, by a quotation, which the reader must have perceived to have no connection with the subject; and he will accordingly find, that the passage in question is taken from a section of PETIT's work, in which he is speaking on a point altogether different. It must be regretted, that a misrepresentation of this nature should not have been corrected in the republication of Dr. MONRO's Remarks in his son's *Essay on Crural Hernia*.

and I cannot help feeling a wish to clear the memory of a man, who has deserved so well of surgery, from the imputation of practising and advising what he did not understand. His sentiments on this subject will not be found inferior, either in argument or style, to those of the more modern author.

As the intestine contained in those herniæ of the cœcum and colon, which are described in chapter ix, section vi, cannot, on account of its firm lateral and posterior connections, be returned into the abdomen; and since, even if it were replaced, the renewal of the protrusion might be anticipated with certainty, in consequence of the great size of the ring in these cases, they are particularly well adapted for the modification of the operation which we are now considering. The nature of the case cannot however be ascertained beforehand; until the sac is opened, the kind of protrusion is not recognised. We must be contented, as soon as we have discovered this point, with removing the stricture, and bringing the integuments together over the intestine, which is left in its place.

SECTION IX.

Operation where the Tumour has not passed the Ring.

IN the case, where the viscera, having entered the upper opening of the inguinal canal, are strangu-

ated by its sides, without having descended through the ring of the external oblique, the aponeurosis of the latter muscle must be divided, in order to expose the tumour. A longitudinal incision, beginning above the swelling, should be carried over its middle, and the cellular substance should then be dissected, so as to bring into view the tendon of the external oblique. When a small opening has been made in the latter, a probe or director may be introduced, and will enable us to extend the cut sufficiently. When the sac, which is covered by the cremaster, is laid open, the edge of the transversus and obliquus internus may be divided, either upwards or towards the spine of the ilium; because the epigastric artery, in this case, is constantly found at the inner edge of the mouth of the sac.

SECTION X.

Complication of Scrotal Hernia with Hydrocele.

WHEN these affections co-exist, their relative situations will probably depend on the order of their occurrence. If the rupture should occur after the formation of the hydrocele, we might naturally expect the former to descend in front of the latter. On the contrary, if fluid should be effused into the tunica vaginalis of a ruptured patient, the swelling would probably rise in front of the rupture. Mr. STANLEY met with two instances, in which hydrocele was placed directly before scrotal hernia, and

the component parts of the spermatic cord were separated by the tumour, which seemed to have been forced between them. These specimens are preserved in the museum of St. Bartholomew's hospital.

In a case of similar complication, Mr. CLOQUE found the rounded fundus of a small hernial sac situated behind, and adhering strongly to the upper part of the hydrocele; the vessels of the cord were partially separated*.

He considers, that hydrocele and other swelling of the testicle may constitute a predisposing cause of ruptures, by dragging down the spermatic cord and with it the depression of the peritoneum, which marks the exit of those vessels†. The co-existence of the complaints is hardly frequent enough to justify this view.

If we should operate when the hydrocele merely advances in front of the lower part of the rupture it will be sufficient to limit the external incision and the division of the sac, so as not to interfere with the tunica vaginalis; and it will be proper to observe this precaution wherever the circumstance will admit. But if, as in the cases observed by Mr. STANLEY, the hydrocele should cover nearly the whole anterior surface of the sac, it might be necessary, in operating, to cut through the former. To avoid embarrassment, the surgeon should carefully ascertain the exact state of things before he begins.

* *Rech. sur les causes et l'Anat. des Hernies Abdom.* Obs. iv. p. 22, fig. iv, pl. ix.

† *Ibid.* p. 21.

CHAPTER XII.

OMENTAL RUPTURES.

MANY of the circumstances peculiar to these ruptures have been already mentioned in the preceding chapters; and will not of course be repeated here.

The omentum has been protruded at the abdominal ring, and under the crural arch of the same subject; at the ring and navel; and at both rings. I have seen it in a double scrotal rupture, at the very bottom of the scrotum on both sides. It is said to be much more commonly found in ruptures of the left than of the right side*.

The characteristic symptoms of an epiplocele are mentioned in the third chapter. The tumour, when incarcerated, is very indolent, and will bear considerable pressure. It is in some cases very difficultly distinguished from other complaints: the distinction between it and cirsocele has been fully explained in the tenth chapter.

* Lorsque l'épiploon concourt à la formation de la hernie, il sort par l'anneau gauche beaucoup plus fréquemment que par le droit. Cette remarque, faite anciennement par VESALE et par RIOLAN, a été, depuis, confirmée par les observations de plusieurs autres chirurgiens très versés dans le traitement des hernies. ARNAUD affirme, sans hésiter, que, sur vingt hernies inguinales épiploïques, il y en a dix neuf du côté gauche. SCARPA, m. i, § 29.

After long residence in the scrotum, it becomes thickened ; and it has been in some cases almost separated from the abdominal cavity by the pressure of a truss. Such instances have probably given rise to the observations, in which individuals have been said to possess three testicles. The diagnosis is often very difficult, where an omental rupture is complicated with cirsocele, hydrocele, or enlarged testis. The most accurate examination of the parts will not always disclose the nature of the swelling under such circumstances. As the two disorders seldom begin together, a history of the progress of the tumour will much facilitate our discrimination.

The danger and inconvenience of an epiplocele are generally less than those of an intestinal rupture in consequence of the comparative insensibility of the omentum. Yet the apparently harmless nature of the complaint should not lead us to disregard it, since, besides the risk of its incarceration, it exposes the patient constantly to the occurrence of an enteroceles. The connections of the omentum to the stomach and colon are a further source of suffering from the irritation produced by its dragging on these viscera. Hence arise in certain cases nausea, vomiting, colic, want of appetite, and painful feelings, which are often relieved by bending the trunk forwards. Since a very small rupture may occasion these symptoms, a careful examination of the abdomen is necessary in obstinate affections of the viscera.

As the omentum very readily contracts adhesions

to the sac, it is important to reduce it early, and to confine it within the abdomen by means of a truss. The increased bulk of the part in old ruptures, and particularly in fat subjects, renders such cases more especially adapted for the treatment by rest and depletion, described in the chapter on irreducible herniæ.

Although an epiplocele is ordinarily indolent, considerable pressure or violence will cause pain, inflammation, and suppuration, and even gangrene of the part*. Such effects have been produced by trusses. The inflammation, extending to the cavity of the abdomen, becomes a source of considerable danger. In the most favourable termination an abscess forms, from which pus is discharged, with separated portions of the membrane. Cases of this description have terminated fatally.

Of all the parts, which form the contents of herniæ, the omentum is found to deviate most frequently from its healthy structure. Indeed it possesses very seldom a perfectly natural appearance, when it has been inclosed for some time in a hernial sac. It becomes considerably thickened below the ring, and hence is firmer to the feel. That part which resides in the neck of the sac is sometimes thickened and indurated, while the portion below retains its

* See the three first cases in Mr. POTT's *Observations on Ruptures*, in his *Works*, vol. iii. A fatal termination took place in the second, from gangrene of the omentum, produced by a tight truss. See also PETIT, vol. ii, p. 340 — 342; LE DRAN, obs. lxiii; CRANAUD, *Mem. de Chirurg.* p. 546.

natural texture. When it has suffered strangulation for a few days, it often becomes of a dark red livid colour; and there is an appearance, on cutting it, as if some blood were extravasated in its substance. This I believe is the state which surgeons have generally described under the term of gangrene. An incision into the part, under these circumstances, is not attended with any bleeding. A portion of omentum, when thus diseased, admits nevertheless of being expanded as in its natural state. But it is sometimes converted into a solid fatty mass, where every vestige of the original structure is lost. I have met with it in an old umbilical epiplocele, forming a mere lump of fat, equal in size to two fists. SCHMUCKER mentions instances, where it has constituted in this manner masses of twelve* ounces, and a pound and a half in weight. POUTEAU† gives a case, where forty-five ounces were removed in the operation. The induration sometimes proceeds to such an extent that its state has been described by the epithets “scirrhus§” and “cancerous||”. These terms denote the hardness merely, and not the kind of disease. True carcinoma is not seen in this viscous

To return a portion of omentum, when diseased

* *Vermischte Chirurgische Schriften*, vol. iii, p. 197.

† *Ibid*, vol. ii, p. 56.

‡ *Ouvrages Posthumes*, vol. iii, p. 173. ARNAUD even mentions its forming a mass of 8lb. 13 oz. in weight in an exomphalos; *Mémoires de Chirurgie*, tom. ii, p. 416.

§ COOPER, page 32.

|| POTT's *Works*, vol. iii, p. 253.

in the manner which we have now described, would be a very bad practice, for two reasons. It would often require so large an incision of the ring as to weaken the parts considerably, and thereby increase the chance of a future protrusion. The presence of such a diseased mass in the abdomen would also excite inflammation in the surrounding parts, and thereby bring the patient into a state of danger, not less than that from which the operation had relieved him. This at least was the event in a case recorded by Mr. HEY*: the subsequent symptoms and the dissection clearly showed, that the patient's death arose from inflammation excited by the replacement of a diseased mass of omentum. In another case, recorded by the same surgeon†, a diseased portion of this membrane, which had been returned into the abdomen, was found upon dissection completely mortified; and would probably have caused the patient's death, even if the returned intestines had not become gangrenous. The danger arising from the replacement of diseased omentum is further exemplified in an instance related in the tenth volume of the Medical and Physical Journal‡. A portion of this organ, described as being of "a livid black colour," was returned into the abdomen. Violent inflammatory symptoms, attended with constant vomiting and restlessness, appeared soon after the operation; and every thing

* *Practical Observations*, p. 172.

† *Practical Observations*, p. 217.

‡ ROBERTSON, *Case of Hernia congenita*, p. 33.

dicated the most unfavourable termination. An abscess formed, from which four pounds of matter, together with a sphacelated portion of omentum, eight inches long and two broad, were let out; and the patient recovered.

Various proceedings have been employed in the management of such diseased pieces of omentum as surgeons have thought it wrong to return. They have placed a ligature on the root of the altered part, removed the substance below this, and then returned the remainder into the cavity of the belly, retaining the ends of the ligature on the outside. It happens too frequently in the practice of surgery, that an unfounded fear of hemorrhage causes the ligature to be used under circumstances, where the knife alone would answer every reasonable purpose. It must have been some vain apprehension of this kind, that induced operators to tie the omentum, previously to retrenching the diseased part. The consequence of this practice is an inflammation of the omentum, extending within the abdomen to the stomach and transverse arch of the colon. This is the circumstance, which, represented in several cases by the best surgical writers, militates so strongly against including the omentum in a ligature; and a case, which I shall presently produce, tends to reprobate it, if possible, still more. What can indeed be more contrary to reason, than the practice, which we are now considering? The symptoms, which oblige us to operate, arise from the pressure of the ring upon the omentum: no sooner have we

freed the part from this stricture, than we subject it to a more close one: for the ligature does what the ring did before; and does it more effectually. If strangulation of the omentum by the ring is sufficient to produce dangerous and mortal consequences, must they not be equally expected from that stricture which is caused by the ligature?

CASE I.

A WOMAN, not less than sixty years of age, was sent into St. Bartholomew's hospital, May 28, 1800, by Mr. BLAIR, with symptoms of a strangulated umbilical hernia. According to her own history, she had been pregnant about twenty-three years previous to her present indisposition; when, as she was suffering much from labour-pains, a tumour made its appearance at her navel. At first it was about the size of an orange, but, never being sustained by bandage, it increased slowly till it acquired a very considerable magnitude. It had continued for that long space of time without any particular inconvenience to her, if we except those occasional attacks of cholic, diarrhœa, and vomiting, to which most persons (especially those advanced in life) afflicted with this kind of hernia are so peculiarly liable*. Eleven days, however, before her admission into the hospital, the tumour, already very large, still grew larger, became extremely painful

* PORT, vol. ii, p. 167.

and tense, and a tenderness extended over the whole surface of the belly; all this while she had had no evacuation by stool, there was continual nausea and vomiting; and her pulse was frequent and small, with thirst, and other febrile symptoms.

Surgeons are well informed, that the existence of an epiplocele (as it will afterwards appear that this originally had been) renders persons so afflicted constantly subject to the protrusion of more of the contents of the abdomen. This was precisely the unfortunate circumstance that had happened in the present instance; for though our patient had lived tolerably comfortable for twenty-three years, with almost the whole of the omentum in a hernial sac, yet in the end a small piece of the intestine happening to slip down, converted the disease into an entero-epiplocele, and, being in an incarcerated state, gave rise to all the urgent symptoms of the last eleven days.

It must be acknowledged, that in many cases of exomphalos it frequently becomes a matter of the greatest difficulty to ascertain whether the bad symptoms arise from strangulation, or from other affections of the abdominal viscera, with which persons having such herniæ are so much troubled; but in the one under consideration the difficulty appears to have been less: for the sudden increase and inflamed state of the tumour, the long duration of the symptoms, and particularly of the suppression of stools, sufficiently indicated the nature of the case. The operation was performed in the

evening, and the division of the integuments and hernial sac brought into view a very large mass of thickened and indurated omentum, which adhered so firmly to the whole internal surface of the sac, that a great deal of dissection was necessary to separate them. Beneath the omentum a strangulated portion of the jejunum was discovered, about five inches in length. The intestine was returned into the abdomen without making any division of the parts through which it had come out, and the large mass of diseased omentum, that composed the great bulk of the hernia, remained at the disposal of the surgeon.

The operator placed a ligature round the root of the protruded omentum. The great sympathy between this part and the stomach was conspicuous to every observant spectator: at the moment that the ligature was drawn the patient's agony was heightened, her vomiting instantly recurred. But this momentary increase of pain and sickness is only a matter of trifling importance, when we contemplate in a comparative view other more permanently pernicious and frequently mortal effects of this practice. It is the succeeding inflammation of the epiploon that ought principally to excite alarm.

The operator next proceeded to amputate what remained of the omentum below the ligature, which might be about three quarters of all that was protruded, and the rest was left with the ligature in the hernial sac unreduced. The patient, soon after the operation, had stools, but the pain at her stomach

was excruciating, and her vomiting soon returned and became incessant: her nights were restless, and finally, after lingering eight or nine days, she died: a little before her death a portion of the integuments, which formerly contributed to envelop the hernia, sloughed. Her body was examined in the presence of many of the pupils of the hospital, when the usual and fatal effects of the ligature were seen. Within the abdomen the omentum was in a gangrenous state, and inflammation had extended to the colon; all the rest of the abdominal viscera had a healthy appearance.

CASE II.

I HAVE lately seen another instance, in which a large mass of omentum, contained in a strangulated scrotal rupture, was included in a ligature. The patient died so soon after the operation, of inflammation of the bowels, that the effects of the ligature could not be sufficiently displayed: yet the state of parts, ascertained by dissection, renders it probable, that the consequences of this practice would have been very injurious had the patient survived. The omentum was collected by the ligature into a thick mass, tightly stretched over the intestines, and manifestly dragging on the stomach. If it had become fixed by adhesion in this state, may we not reasonably conclude, that the irritation of this unnatural connection would have produced the most distressing effects on the stomach? The part round

which the ligature was placed, had ascended about three inches within the abdominal ring. Hence the portion of this viscus below the ligature would have sloughed within the abdomen, and the patient must have encountered no trivial risk from this source.

CASE III.

AN observation, published by POUTEAU, shows us how much danger we ought to apprehend from including the omentum in a ligature; and, as it supports the truth of the opinions, which I have delivered on this subject, it may be proper briefly to annex the particulars. The operation for bubo-nocele had been performed on a young man twenty-five years of age; it was not difficult, after releasing the intestine from stricture, to return it apparently in a sound condition. A portion of omentum, which had accompanied it, was too large to be replaced without a very extensive incision: wherefore POUTEAU determined to employ the ligature, and extirpate it. Soon after the operation, the vomiting, caused by the strangulation, ceased, and the patient had stools; but in a short time he complained of an acute pain at the stomach; the whole surface of the abdomen became extremely tender, and he expired thirty-six hours after the operation, although all the medical assistance had been afforded him that his situation demanded. On opening the body, the omentum was found sloughy through its whole

extent, and had contracted adhesions to the peritoneum*.

In the third volume of Mr. POTT's works we find a relation of three † cases, where the omentum inflamed and became gangrenous in consequence of a ligature upon it; all which terminated in death. The mind of this celebrated surgeon was so deeply impressed with the fatality of the practice, that he declares his intention never to employ the ligature again ‡. Two other examples of the fatal effects of the ligature may be found in the third volume of the *Mémoires de l'Académie* §.

It has been a question in the Academy of Surgery at Paris ||, whether, before returning the omentum

* SABATIER *de la Médecine Opératoire*, tom. i, p. 23.

† Page 259 — 266.

‡ “As I am by repeated experience convinced, that a portion of the omentum, however large, may be extirpated with perfect safety, without being previously tied, I shall never practise nor advise the ligature.” POTT's *Works*, vol. iii, p. 259. See also his remarks on the same subject, vol. ii, p. 133.

§ Pages 73 and 399, 4to. edition.

|| See two memoirs on this subject, in the third volume of the *Mémoires de l'Académie*, by Mr. VERDIER and Mr. PIPELET. That of the former is entitled, “*Sur une plaie dans la capacité du bas ventre; avec des remarques sur la ligature de l'Epiploon*,” p. 367; the latter is, “*Sur la ligature de l'Epiploon*,” p. 394: BOUDOU, chief surgeon of the Hotel Dieu, had so often experienced the bad effects of the ligature, that he was induced to give it up, tom. iv, p. 316. Mr. CAQUÈ, surgeon to the hospital at Rheims, had extirpated the protruded portion of omentum and returned the remainder without any ligature, in nine cases, with success, *ibid.* tom. iii, p. 407.

In speaking of protrusions of the omentum caused by penetrat-

into the abdomen, there was any necessity for tying its cut edge. Many observations on the human subject, and several experiments on dogs, showed that no danger arose from its being replaced without a ligature, and that the practice of tying it often produced injurious consequences. This our illustrious countryman SHARP had already determined by his own experience; he had constantly practised the excision of the omentum without a ligature, having found the apprehension of bleeding perfectly groundless*. We must then conclude, that if SHARP and POTT, two of the ablest surgeons this country can boast of, never experienced any trouble from hemorrhage of the omentum when no ligature was used; if the most enlightened foreign practitioners have met with the same success; and if such pernicious and fatal consequences do follow tying the omentum, as there is abundant evidence to prove to be a fact; certainly, a continuance of the practice can only discover a backwardness among surgeons to listen to the instructions of experience, and a reluctance to countenance the most valuable improvements†.

ing wounds, LARREY says, “ la ligature totale faite sur la portion saine de l’Epiploon est généralement suivie d’une irritation profonde, violente, accompagnée d’inflammation, d’abcès, souvent de la gangrène, et de la mort. J’en ai vu un grand nombre d’exemples.”—LARREY, *Mémoires de Chirurgie Militaire*, tom. iv, p. 277.

* *Critical Inquiry*, p. 35.

† The reader will probably think that the facts and arguments, which I have adduced on the subject of tying the

I do not advise that the part should be returned into the belly, when there is any bleeding from its cut edge. The objections are only applicable to the practice of tying the omentum in a mass: they do not affect the very necessary and proper precaution, justify my unfavourable opinion of that practice. Being supported in these sentiments by the concurrent testimonies of the most able surgeons, I have no motive for suppressing the contrary statements of ARNAUD, whose experience on this particular subject has perhaps never been equalled by that of any other individual. He gives the following general result of his practice. “ De plus de huit cents operations de hernies, que j’ai faites en ma vie, je crois en avoir trouvé plus d’un tiers avec des epiploceles; et je puis protester qu’il ne m’est jamais mort un seul malade par la faute de la ligature.” *Mem. de Chirurgie*; t. ii, p. 6, 627. Nothing can appear more favourable than this assertion; yet we find, that the ligature caused sometimes, in the practice of ARNAUD, those unpleasant effects which occurred to other surgeons. After employing two ligatures, he removed one pound and three ounces of omentum. The operation was followed by an extremely painful and distressing sensation in the epigastric region, nausea, hiccough, and vomiting. Copious bleedings and narcotic remedies were equally ineffectual in subduing these symptoms, which ceased immediately on removing the ligature. It should seem from the following quotation that these effects often ensued, and were relieved in the same way.

“ J’ai toujours employé cette methode, et elle m’a toujours réussi, excepté dans des occasions, ou j’ai été obligé de couper la ligature aussitôt que je me suis appercu que l’orage se preparoit, sans m’occuper envain de saigner ni de mediquer mes malades. Dès qu’elle est coupée les accidens cessent.” When we consider that the omentum is drawn up into the abdominal cavity, after its replacement, we have some difficulty in understanding how the ligature could be so readily removed.

tion of securing individually, by small silk ligatures, cut off close to the knots, any vessels which afford hemorrhage. When this has been done, the part may be returned into the cavity.

Some surgeons have recommended, that the omentum should be left in the wound, particularly in an old hernia, where the parts have been long down. Cases are recorded, which show the safety of the plan, proving that granulations extend over the omentum, and that a firm cicatrix ensues*. This practice, which I cannot speak of from my own observation, does not appear to me to deserve recommendation. It is attended with no particular advantage, but certainly exposes the patient to the possibility of ill consequences. The omentum left in the wound must be liable to injury, inflammation, or disease. Unnatural adhesions, formed by this part, have greatly impaired the functions of the stomach. Cases are recorded, where the unfortunate patient has never been able to take more than a certain quantity of food without bringing on instant vomiting; and even where it has been necessary for all the meals to be taken in the recumbent position, with the trunk curved and the thighs bent†. To avoid the possibility of such afflicting

* HEY, p. 180 et seq. CHOPART and DESAULT state, that when the omentum is irreducible merely from its bulk, they leave it in the wound, and it gradually retires into the abdomen. — *Traité des Mal. Chirurg.* t. ii, p. 269.

† GUNZ, *Obs. Anat. Chir. de Herniis; Mémoires de l'Académie de Chirurgie*, tom. iii, p. 406.

consequences, we should, after removing any diseased portion, carefully replace the sound part of the omentum in the abdominal cavity, that no obstacle may exist to its regaining that situation in which its connections with the stomach and colon would naturally place it.

Since then the practice of removing diseased omentum, of securing the bleeding vessels, and of returning the remainder into the abdominal cavity, has never produced any injury to the patient, nor is likely to be followed by any ill consequence; it must, in the present state of our knowledge, be considered as the most advisable treatment.

CHAPTER XIII.

TREATMENT OF RUPTURES, IN WHICH THE INTES- TINE HAS MORTIFIED.

SECTION I.

Symptoms of Mortification and Prognosis.

THE contents of a hernia are often affected with gangrene, when no symptom or appearance existed previously to the operation, which could lead to the suspicion of this occurrence. Here the integuments and hernial sac are perfectly healthy. It happens, however, more frequently, that the superincumbent parts are affected, in consequence of the mortification of the hernial contents; and the integuments are largely included in the sloughs.

The occurrence of mortification is generally shown by the tumour losing its tension, and becoming soft, so that it pits on pressure; the integuments, which are very red, become livid, and afterwards black in one or more spots, and the cuticle separates; the cellular membrane is emphysematous; the pain, vomiting, and hiccough cease; the pulse sinks and becomes irregular; the body is covered with a cold sweat; the countenance changes; the mental functions are disturbed; lastly, the integuments give

way, and a discharge of wind and fecal matter in a highly fetid state ensues. When the stricture is very tight, the gut sometimes bursts, and the feces escape into the abdomen. Sometimes the rupture spontaneously recedes, and fetid stools are passed. The patient is generally exhausted before the complaint has proceeded to this extent; but the powers of nature occasionally support him through this dangerous state, and even effect a complete recovery. Though the numerous instances of these events, which occur in the records of surgery, should lead us to persevere in the use of such means, as may be likely to aid the salutary operations of nature, they ought not to raise any sanguine hope of similar results in general practice, nor lead us to give any other prognostic, but such as would prepare the minds of friends for the fatal termination.

A consideration of the appearances in the intestine, which indicate the presence of gangrene, will be found in chapter xi, sect. v.

The state of the abdominal cavity, in patients who die with mortified herniæ, is the same as I have described in speaking of strangulation. Great distention and vehement inflammation of the intestinal canal above the stricture, extending more or less to the other bowels, and to the peritoneum in general, attended with partial effusions of coagulating lymph, and of a turbid fluid, and with universal agglutination of the opposed membranous surfaces, constitute the chief features of the disorder. The mortified gut is the centre, from which the in-

flammation extends ; this part almost invariably adheres to the parietes of the cavity, and to the surrounding viscera, as well as to the hernial sac. Other parts of the canal, above the stricture, are not unfrequently found in a gangrenous state. It is the part of the canal, between the stomach and the intercepted portion, that suffers principally : the distention and inflammation are here at the highest pitch ; we see it stretched to three or four times its natural dimensions, and filled with air and liquids. A few of these enormous folds present themselves on exposing the cavity, and hide the remainder of the bowels, which are contracted, and comparatively free from disorder. The peritoneal sac, too, often participates only in a slight degree.

The disorder within the cavity is not always so great ; and in some instances it is confined nearly to the protruded viscus. On these differences the events of particular cases must in great measure depend.

The chances of recovery are much greater, both in mortification and in wounds of the large, than of the small intestine. This difference was clearly understood by the older observers, who pronounced wounds and mortification of the small intestine to be absolutely fatal, while they only deemed those of the large highly dangerous. For this difference, which is fully established by the records of surgery, we can account in some degree by considering, that the contents of the large intestine are

less disposed to pass through the wound, both because it bears a smaller proportion to the dimensions of the canal, and because they are less fluid. Further, that the absorption of the chyle is complete, when the seat of mischief is in the large intestine; but more or less imperfect, according as the wound is nearer to, or farther from the stomach in the small intestine. In the latter case, the patient has often perished from defective nutrition, which event cannot occur in the former. See the cases cited in a note at p. 307.

The probability of a favourable event is much greater in some kinds of rupture than in others. It has often happened, that the strangulation has included a part only of the diameter of the gut. In several cases of this description the feces have been partially discharged through the mortified opening: this quantity has diminished gradually as the wound healed, and the patient has completely recovered*.

When an intestine has had a part of its diameter thus protruded, the superior and inferior portions of the tube unite at the ring in a more or less acute angle. If we lay open the canal, a projecting ridge is observed on the inside, in the situation corresponding to the mesentery; and this is the obstacle to the passage of the intestinal contents from

* Many such instances are related by Mr. Louis, in his "*Mémoire sur la cure des Hernies Intestinales avec Gangrene,*" *Mémoires de l'Acad. de Chir.* tom. iii. See also *Lond. Med. Journal*, vol. x, p. 72.

the upper into the lower portion of the gut*. SCARPA has imitated these protrusions on the dead body, and found, that when he inclosed two-thirds of the diameter, water injected into the superior portion passed with very great difficulty, or not at all into the inferior, the angle towards the mesentery being very acute, and the projecting ridge within the intestine preventing the communication of the two portions; where one-third only was constricted, the angle was in different instances more or less acute, and opposed more or less resistance to the passage of fluids through the constricted parts†.

In a hernia of this kind, the adhesive inflammation unites the peritoneum forming the neck of the sac to the sound portion of intestine; and the two ends of the latter, after the mortified part has separated, open into a membranous cavity, which before constituted a portion of the peritoneal sac, and now unites the extremities of the gut. If the prominent ridge be not too considerable, the intestinal contents may pass from the upper portion of the tube into this membranous cavity, and thence find their way into the lower portion. The gradual contraction of the wound closes the membranous cavity externally, and thus the continuity of the canal is restored. The two ends, however, are not joined so as to form a continued cylindrical

* These circumstances are well represented in SCARPA'S ninth plate, fig. ii and iii.

† Mem. iv, § viii.

tube, like that of the natural gut; but they are united at an angle more or less acute, and the matters which go from one to the other describe a half circle in a newly formed membranous cavity that completes the canal.

If the gangrene has only attacked one or more small spots, the event of the case may be favourable. The intestine, when returned, becomes adherent to the surrounding parts; and the mortified spots may be separated internally, so that the contents of the bowel never appear at the wound.

When the cœcum with its appendix has been protruded, the mortification of these parts has affected the natural course of the feces but little, and a perfect cure has rapidly taken place*.

The process employed by nature in this case, as also when a small opening has taken place in any other part of the large intestine, is simple and obvious. The opposed peritoneal surfaces of the gut and sac are united by adhesions: as the wound granulates, the opening gradually contracts, and thus diminishes the efflux of intestinal contents; while no obstacle exists to their passage in the natural course. The completion of the cicatrix makes the tube again entire.

* *Edinburgh Med. Essays*, vol. v, art. xxxiii; *London Med. Obs. and Inquiries*, vol. iii, art. vii; *HEY'S Practical Obs.* p. 162, et seq.; *Edinburgh Med. and Surg. Journal*, vol. ii, p. 313.

SECTION II.

Treatment of Mortified Hernia, where a Part only of the Tube has been strangulated.

THE incessant vomiting, pain, restlessness, distress, and extreme constitutional disturbance, are caused by the distention of the alimentary canal above the stricture, and will not cease till that is unloaded. The first and most urgent indication is to procure this relief, which we should hasten to afford, even if it were simply to release a patient from a condition of most urgent suffering. But it is also essential, as a means of averting the impending fatal termination, and thus giving an opportunity for the completion of those salutary processes, by which more or less perfect restoration may be effected*. Let a free incision be made

* The extreme distention, therefore, says SCARPA, of the upper part of the intestinal canal, and the increased action excited in it to free itself from the distending and irritating cause, are the principal source of the acute pains which the patient feels in the whole circumference of the abdomen, and especially in the umbilical region, which are much greater than those occasioned by the strangulated intestine. This state of violent irritation and increased action, always accompanied by great inflammation, and afterwards gangrene, is what, properly speaking, kills the patient, rather than the incarceration of the intestine included in the hernia. I am of opinion, that if the rupture of the strangulated intestine occurred much more speedily than it commonly happens, and before that portion of the intestinal tube continued from the stomach were subjected to the enormous distention and excitement, such as are observed in the

through the mortified part of the gut, in order to procure that evacuation of the loaded canal, which nature attempts by the process of gangrene. The sudden and marked alleviation of the symptoms and of the patient's distress, and the repose which usually follows, justify the measure, and sufficiently indicate the amount of the benefit conferred. If the intestine had already given way, a free division of the integuments and sac allows the exit of the accumulated matters; and the opening in the gut may be enlarged, if it be not already sufficient.

It is well observed by my friend Mr. TRAVERS*, that the division of the stricture is unnecessary; for the bowel is already relieved, at the expense of its life indeed, by the natural process of mortification. If the feces issue freely, it is all we can wish; should the stricture be so narrow as to interfere with this discharge, a small incision will afford the requisite room: to ascertain this point, and also to discover whether there be any interior constriction, let the end of the little finger, or a female catheter, be cautiously introduced into the bowel.

The aid of art can do nothing towards restoring the continuity of the canal, and the natural course of the intestinal contents: the strongest proof of wisdom in the surgeon will be, to abstain from all means that might interrupt the salutary operations

dead bodies of those, who die of strangulated hernia, the event of this severe disease would not be, at least, either so quickly or so frequently fatal. English translation by WISHART, p. 296.

* P. 300 et seq.

of nature. The intestine is adherent to the peritoneum about the ring, and to that portion of the membrane, which forms the neck of the sac; these adhesions are of the greatest importance in the subsequent progress of the cure; and should therefore never be disturbed. The measure of dividing the stricture, which is simply unnecessary in reference to the state of the intestinal canal in general, is absolutely injurious, because it cannot be done without destroying the adhesions more or less extensively. To pass a finger into the ring, and turn it round, so as to detach the gut, is an act of gratuitous mischief, indicating a criminal degree of ignorance.

Whether the intestine should have given way spontaneously, or have been opened by the surgeon, mild purgatives and clysters will be proper to unload the bowels, and to determine the course of the feces towards the anus. The use of both these means with the latter object, constitutes a very important part of the treatment of all cases of mortified intestine.

The employment of nutritive clysters, and the abstaining from taking food or drink by the mouth, would promote the consolidation of the wound, by cutting off the passage of feces through it. This plan, suggested by ACREL, was found very serviceable in the following case*.

* *Der Königl. Schwedischen Akademie neue Abhandlungen*, t. viii, p. 36.

CASE.

A MAN, 26 years of age, was admitted into the royal hospital of Stockholm, for an incarcerated inguinal hernia of the right side. The intestine, when exposed by the operation, not being discoloured, was replaced in the cavity, and the case proceeded favourably until the thirteenth day. Excrements were now observed in the wound; and they soon came altogether by that way. As the means employed for this patient's relief produced no good effect, it was resolved to nourish him per anum, and allow nothing to be taken by the mouth. ACREL had previously introduced his finger with caution into the wound, and states, that the affected intestine was the cœcum, in the large cavity of which he could move his finger freely. A clyster was administered every morning to clear the canal; and a certain quantity of broth, with the yolks of eggs, was injected twice a day, at ten in the morning, and six in the evening. The patient was nourished in this way for thirty-six days, during which time he became thin and weak. When the upper part of the canal was cleared of its contents, pure bile flowed through the wound, producing pain and excoriation, which distressed the patient exceedingly. A spoonful of broth was occasionally given by the mouth, to obviate these effects; and a small quantity of excrement again appeared at the groin. The wound improved in its appearance,

and contracted in size: pressure was used, and caustic occasionally applied to the edges. After the opening had contracted, so as to prevent the passage of the feces, a fetid moisture, discolouring the linen, still came through for fourteen days, and then ceased.

SECTION III.

Treatment where a small Spot only has mortified.

WHEN a larger portion of intestine has descended, it may be affected with gangrene, in one or more spots, the rest remaining comparatively sound; or it may have become mortified through a greater or less extent of its whole diameter. Various proceedings have been adopted in the former case. We are recommended to leave the gut in the wound, after removing the stricture; in addition to this, some have advised excision of the mortified part*. Others have returned the intestine, retaining it in the neighbourhood of the ring, by a ligature passed through the mesentery, and confined externally by adhesive plaster. The fear of an effusion of fecal matter into the cavity of the abdomen, on the separation of the slough, formed the objection to the replacement of a mortified portion of gut: and the intent of the ligature placed in the mesentery was to prevent the possibility of this much-

* RICHTER, *Tr. des Hernies*, p. 150.

dreaded effusion, by keeping the sphacelated part opposite the ring. The foundation of these apprehensions must be carefully examined, before we can fairly appreciate the treatment which they have suggested. Two questions here offer themselves for discussion: whether a replaced portion of intestine usually leaves the ring, and moves to some distant part of the cavity? and whether, on the separation of the sphacelated part, an effusion into the abdomen may be expected?

The inflammation, which precedes the mortification of the intestine, is found to extend along the canal, and to agglutinate the neighbouring parts to each other, and to the abdominal parietes. Thus the returned gut is mechanically confined to the neighbourhood of the ring, and a complete barrier is opposed to its removal from that part. If adhesions had not formed previously to the operation, which probably is very seldom the case, there is every reason to suppose that they would take place afterwards; for it is invariably found, when a fatal termination enables us to ascertain the state of the parts after death, that the replaced viscera are close to the ring, and are adherent to the surrounding parts. DESAULT states the result of his experience on this point in the most unqualified terms: he has learned from dissection, that the portion, which formed the hernia, never recedes from the ring*.

The authority of DELAFAYE may be cited in far-

* *Parisian Surgical Journal*, vol. ii, p. 366.

ther confirmation of this point. "When the intestine sloughs after being returned into the abdomen, we might," says he, "apprehend an effusion of feces into the cavity; but this fear is groundless, as the intestine remains opposite the ring: accordingly the contents of the bowels come through the wound some days after the operation*."

I have witnessed the same fact in many instances; and, indeed, have always found the replaced intestine near the ring. Numerous testimonies might be cited to the same effect.

When it is proved, that the returned part remains close to the ring, we may lay aside all fear of effusion into the abdomen. The wound of the operation affords the most ready exit for the fecal matter, which never penetrates into the cavity.

We should not, however, be justified in expecting the feces to spread over the abdomen, even if the intestine were not exactly against the ring. PETIT†, in his excellent *Memoirs on Effusions*, has long ago refuted the commonly received notions on this subject both by facts and reasoning: he has clearly shown, that the contents of the intestine, or blood, shed in the abdomen, do not spread loosely over the cavity; that the pressure of the respiratory muscles affords the obstacle to such an extension; that the effused matters, being poured out in opposition to considerable resistance, are

* *Cours d'Operations de DIONIS*, ed. v, 350, note a.

† *Memoires de l'Academie*, tom. i & ii. See particularly the 'Essai sur les Epanchemens du bas ventre,' in the second vol.

collected in one spot, to which they become confined by the inflammatory agglutination of the contiguous parts, and where they form what the French call a *depôt*.

The effects of this pressure, arising from the action and reaction of the muscular parietes and contained viscera, in preventing the escape of the contents of the latter, are well illustrated by penetrating wounds of the abdomen. Several persons have recovered, without any internal effusion, after being run through the body, stabbed, &c. Experiments on animals, performed by Mr. TRAVERS, have shown, that punctured wounds of the intestines are generally closed by adhesion, and not followed by any escape of fecal matters. Sometimes, however, breaches of continuity in the intestines are followed by extravasation of the contents. If the wound be incised or punctured, the intestine empty or only moderately filled, the size of the aperture small, and its direction transverse, adhesion may be expected. On the contrary, the contents will probably escape, where the opening is lacerated, or made by ulceration, the bowel full, the wound large, and its direction longitudinal. The most clear and satisfactory account of the whole subject will be found in the three first chapters of Mr. TRAVERS'S work.

We may then safely conclude, as the annexed cases will most clearly demonstrate, that the alimentary matters, effused from a mortified intestine, will find their way through the wound, and not be spread over the cavity.

If we have no reason to fear, either that the intestine should move from the ring, or that its contents should be effused into the abdomen, there can be no doubt as to the conduct required, where a portion only of the gut is affected with gangrene: we should replace it in the cavity, with the mortified portion towards the wound, and await the result of the operations of nature without interference. A ligature in the mesentery is unnecessary. In these, as in all cases of mortified intestine, the most rigid attention to diet is indispensable. Here too, as in the last mentioned case of mortification, the use of purgatives and clysters is required, for the same reasons as were then stated. The termination of the case will be influenced by various circumstances, which can be but very little modified by any efforts of the surgeon. It is unfortunate when the opening is in the upper part of the intestinal canal*. The most favourable termination is when

* In a case where every thing was going on well, the patient died from want of nourishment; the opening having taking place in the jejunum: COOPER, pt. i, p. 33. A similar instance is recorded in the *Giornale di Medicina*, vi, p. 401. Two cases are quoted in the *Mem. de l'Acad. de Chir.* t. v, p. 597, from HOIN's *Essai sur les hernies rares*, where the same circumstance led to a fatal termination. DESAULT ascribes to this cause the death of a patient, in whom the opening took place at the end of the ileum; *Œuvres Chirurg.* t. ii, p. 356. A patient of Sir A. COOPER's, in whom the lower portion of the ileum had been protruded, died from defective nutrition nine days after the operation; all aliment, whether solid or fluid, passing off very little changed in the space of an hour. *Anatomy, &c. of Crural and Umbilical Hernia*, chap. vii. p. 31. In a case of this kind

the alimentary matter, after finding its way for some time, either wholly or in part, through the wound, gradually resumes its natural course. The powers of the patient may sink under the disease, or he may recover under the disgusting and terrible necessity of voiding his excrement for ever after through the wound.

That the conduct, which has been here prescribed, may be followed, not only without any ill consequences, but with the most complete success; that the contents of the intestine, when the dead part gives way, come through the wound, instead of spreading over the cavity; and, consequently, that the replaced part does not quit its position behind the ring, are points completely proved by the following case.

CASE.

EDWARD TUBBS, a sailor, 22 years of age, was admitted into St. Bartholomew's Hospital, under the care of Mr. LONG, with a strangulated scrotal rupture. The operation was delayed longer than it would otherwise have been, by the patient's refusing for some time to submit to it: but there were no symptoms nor appearances indicating the occurrence of mortification. When he at last consented,

the most nutritive kind of food, such as strong soup, jellies, &c. should be taken frequently in small quantities, in order to afford an opportunity for the greatest possible absorption. Broth and milk may also be thrown up per anum.

the contents of the rupture were found to consist of what has been termed a knuckle of small intestine. Mr. LONG observed, when he opened the sac, that the contained fluid had a fecal smell. The ring, which formed a very close stricture, had made a manifest impression on the gut; and a small pin-hole appeared in this part, through which the alimentary matter came. A broad patch of the posterior part of the intestine was manifestly gangrenous; and a smaller portion of the convexity of the fold appeared in the same condition. The gut was returned*; and evacuations were procured per anum, by means of clysters and purgatives. In three days

* I have been informed by Sir A. COOPER, that in a case operated on at Guy's Hospital, where a small opening was observed in the intestine, the aperture was tied with a fine ligature, previously to its being returned; and that the patient recovered.

This is probably the case mentioned by Mr. TRAVERS in his *Inquiry*, p. 112. After explaining, from the result of experiment, that when a ligature has been placed on a portion of the intestinal coats and the gut returned, the peritoneal surface of the latter becomes adherent to the surrounding folds, and the ligature separates into the canal, he properly objects to leaving it long and depending externally. "In such a case all the advantage of the ligature is obtained by cutting the thread close to the knot, as was done by Sir A. COOPER at Guy's Hospital. While performing the operation for a strangulated hernia, an aperture, giving issue to its contents, was discovered in a portion of the sound intestine, just previous to its return into the abdomen. The operator, including the aperture in his forceps, caused a fine silk ligature to be carried beneath the point of the instrument, firmly tied upon the gut and cut close. The part was then replaced, and the patient did well."

the contents of the bowels began to be partly discharged through the wound; and in a short time they all came that way. The evacuated matter was a light yellow frothy fluid, mixed with flakes of a more consistent kind. It had no fecal smell; and was discharged in less than ten minutes after drinking. It caused great inconvenience to the patient, by excoriating the groin; and this was partly remedied by fastening a piece of moistened bladder with sticking plaister close to the edge of the sore, and allowing the discharge to run over this. The general health was perfectly good. In three weeks he began again to have motions per anum, which increased in quantity, while the discharge by the wound was diminished; and this consisted at last of a mere froth. In a very short time the wound had completely cicatrized, and the man was discharged perfectly well.

I have lately seen the appendix cæci returned into the abdomen, when a small part of it had sphacelated; and, as the case is interesting in another point of view, I shall shortly state the particulars.

CASE.

ANN STILLWELL, forty-eight years of age, had been subject for some years to a crural hernia, which became strangulated on the 3d of July, 1809. She was admitted into St. Bartholomew's hospi-

tal on the following evening, opening medicines having been freely administered without producing any effect. As no evacuation could be procured by the repeated employment of calomel with the colocynth pill, in large doses, the operation was performed on the evening of the sixth. The appendix cæci, of which a small spot had sphacelated, with its little mesentery considerably loaded with fat, so as to give the feel of omentum before the operation, formed the contents of this rupture; and it was replaced without any incision of the stricture, although the opening was very small. The progress of the case, subsequently to the operation, was favourable in every respect; and the wound had completely cicatrized on the nineteenth day.

AMYAND* found the appendix cæci perforated by a pin in an inguinal rupture. He removed the part, after placing a ligature between the perforation and the intestine; and the patient recovered without any unpleasant consequence.

The fifty-ninth observation of LE DRAN† is a case in which the intestine gave way on the eleventh day after its replacement in the abdomen. The feces came through the wound, and the patient recovered. "Experience," he says, "has convinced me, that the ligature in the mesentery may be omitted when the intestine has opened, or is ready to open by mortification; because the inflammation

* *Philosophical Transactions*, vol. xxxix, p. 329.

† *Observations in Surgery*, p. 200.

preceding it always produces an adhesion of the intestine."

In an instance mentioned by Sir A. COOPER*, the intestine was replaced, without being confined by a ligature. The feces made their appearance after ten days; and passed for eleven weeks, partly through the wound, partly per anum: at the end of this time their natural course was re-established. Two other facts, in proof of this point, are furnished by PETIT†; and SHARP‡ speaks in general terms of the great number of cases where the feces have been safely discharged through the wound from a gangrened intestine||.

I shall content myself with adding, to the evidence already adduced, the testimony of DESAULT, whose

* Pt. i, p. 35.

† *Memoires de l'Acad. de Chir*, tom. ii, p. 93 and 94.

‡ *Critical Inquiry*, p. 42.

|| In a dissertation by MALAVAL, "*an tenuium intestinorum vulnus lethale*," two cases are mentioned, in which feces came through the wound some days after the operation; but the patients recovered; HALLER, *Disput. Chirurg.* tom. v, p. 77. Mr. WATSON found an oval gangrenous portion of an inch in length, in the intestine, and returned it, keeping the mortified part towards the wound. The feces appeared on the third or fourth day, but took the natural passage very soon after, and the patient recovered; *Med. Communications*, vol. ii, p. 102. Similar instances are mentioned in the *Mem. de l'Acad. de Chir.* tom. ii, p. 93; in the French Medical Journal, entitled, *Journal de Medecine, Chirurgie, Pharmacie, &c. par M. LE ROUX*; tom. xxi, p. 124; in the *Giornale di Medicina*, vi, p. 401; and xi, 25; in the *Neue Abhandlungen der Schwed. Akademie*, viii, p. 36; in THEDEN, *Neue Bemerkungen*, p. 99; in the *Journal de CORVISART*, tom. xxv, p. 169; in SCARPA, m. iv, § 2f.

experience on this point is completely decisive. In operating on a hernia, he found an eschar of an inch in diameter on the intestine. He returned this part, and no subsequent symptoms occurred to denote the separation of the slough. He conceives, that the inflammation of the part surrounding the eschar agglutinated it to the parieties of the abdomen; and that the slough passed along the intestinal canal. But it is not on the event of a single case that he rests the propriety of this practice: he recommends it from the favourable result of his general experience. He has relinquished the loop of thread through the mesentery; "being convinced by experience, and particularly from dissection, that the portion, which forms the hernia, never recedes from the ring, and that there is no reason to apprehend an effusion into the abdominal cavity on the separation of the eschar*."

SECTION IV.

Mortification of the whole Diameter of the Intestine.

IN the case of mortification of the whole diameter of the intestine, we are directed to cut away the

* *Parisian Surgical Journal*, vol. ii, p. 366.

From a consideration of all the facts connected with the history of mortified hernia, SCARPA had deduced the complete inutility of the ligature in the mesentery; m. iv, § 13. The same conclusion is fully established by Mr. TRAVERS on similar grounds. *Inquiry*, &c. p. 296 & seq.

dead part, to introduce the superior extremity of the gut into the inferior, and to sew them together*. Systematic writers have employed themselves in devising various methods for uniting the divided ends. They have debated whether they should be simply sewed together, or supported by substances of some solidity, in order to prevent any subsequent contraction at the point of union; and disputes have arisen, whether a portion of an animal's trachea†, a cylinder of varnished card‡, or of isinglass||, be the substance best adapted to the purpose. These expedients are described with such minuteness and formality, that an inexperienced person might suppose they had been all tried in actual practice. They have, however, fortunately been very seldom employed.

I have no hesitation in rejecting entirely all such proposals; not merely because some are difficult of execution, and some impracticable; but because all are unsupported by the result of experience, and not only inconsistent with our knowledge of the processes, by which restoration is effected in these cases, but directly calculated to interrupt and subvert those processes. By drawing the intestine out of the cavity, in order to remove the dead part (supposing that the agglutination of the sound portion to the contiguous peritoneal surfaces of the sac,

* RANDOHR, quoted below.

† DUVERGER, in the *Acad. de Chirurg.* tom. iii, p. 188.

‡ RITSCH, *Ac. de Chir.* tom. iv, p. 177.

|| WATSON, in *Med. Commun.* vol. ii.

the abdominal parietes, and the surrounding convolutions, will allow it to be thus drawn out, which it often certainly will not*), the adhesions, on which the prospect of a cure chiefly depends, must be entirely destroyed. An inflamed part cannot be handled and sewn, without causing new irritation and inflammation.

The separation of the slough by nature, or its division by the surgeon, allowing the distended alimentary canal to be unloaded, greatly relieves the patient; and the free discharge by the wound prevents the recurrence of distress. If we sew up the gut, and, still worse, if we stop up its cavity with tracheas, isinglass, card, or what not, the part cannot resume its functions; obstruction again takes place, and when the patient's misery is at its height, perhaps nature may be able, by tearing open this ill-advised union, to avert impending destruction†.

Cases, I know, may be quoted, in which the proceedings alluded to above are said to have been successfully employed in mortified herniæ. RAMDOHR‡, who first proposed the introduction of the *superior* into the *inferior* end of the gut (he must

* *Journal de M. LE ROUX*, tom. xxi, p. 260. The surgeon wished to perform gastroraphy, but was prevented by the adhesions.

† See the cases quoted further on, in which the attempts at union have failed.

‡ MOEBIUS, *Observat. Med. Miscellan.* Præside Heistero. 1730; Obs. 18. See also HALLER, *Disp. Anat.* tom. vi, p. 745; and HEISTER, *Instit. Chir.* p. 817.

have had some peculiar method of making this distinction, but he has not imparted the secret) relates, that the patient, on whom he employed his method, a woman with crural hernia, and in whose case he removed two feet in length of the intestine, together with a portion of mesentery in a gangrenous state, recovered. She died of another complaint in a year; and the intestine was removed and given to HEISTER, who preserved it in his museum. DUVERGER* removed a piece equal in length to two fingers, and united the ends on a portion of calf's trachea, with sutures: his patient got well speedily. Other examples are referred to; of one I do not know the particulars†; two others appear to me very suspicious‡.

What then can be opposed to these successful examples? How can our unfavourable opinion of the practice followed in them be justified? The great number of instances in which it has not succeeded, and particularly its uniform failure in this country, combined with the objections stated to it above, lead me to entertain some degree of incredulity respecting these narratives; or, if they should be found to rest upon unexceptionable authority, to

* *Mem. de l' Acad. de Chirurg.* tom. iii, p. 188.

† SCHMIDT, *Diss. de Ileo*; in CREUTZENFELD, *Biblioth. Chirurg.* p. 844.

‡ *Journal de Medecine, Chirurg. &c. de M. LE ROUX*, tom. xxiii, p. 358, tom. lvi, 151. It is strange, that in both these cases, although the union of the gut is said to have been perfect, the patients died in about five weeks after the operation.

conclude, that the successful termination was not brought about in consequence, but in spite of the artificial union of the intestine.

The injurious effects of sewing together the ends of the gut, after removing the mortified part, and the efforts of nature to set aside the obstacles thus thrown in her way, are well illustrated in a case witnessed by that accurate observer, my late much valued friend, Dr. CHESTON, of Gloucester, by whom it was communicated to Sir A. COOPER*. Four inches of mortified intestine having been removed, “the first thought which occurred was the truly pitiable state to which the patient would be reduced in the event of his recovery, by having an artificial anus. Desiring, therefore, if possible, to avoid such a composition for existence, we agreed to bring the gut together by the usual recommendation of gastroraphy. This being effected, and to guard against any ill consequences on the failure of the intention, from a retraction of the intestine into the cavity of the abdomen, two stitches were passed through the mesentery on each side of the divided intestine, and secured to the parietes of the wound.” Mr. NAYLER, the operator, on the following evening “found the young man by no means benefited by the operation. No evacuations had passed by stool, his belly was rather more distended, he was equally sick as before, and now and then teased with hiccough. In this alarming state Mr. NAYLER

* *On Inguinal and Congenital Hernia*, p. 37.

thought it necessary to remove the dressing for the inspection of the part, when observing the wound to bear a very unhealthy aspect, he thought it necessary to remove the stitches on the intestine, bringing its open extremities just without the edges of the wound, to allow of an easy discharge of air or feces contained in the superior part of the canal. In the course of the night, when the patient appeared almost expiring, a sudden and violent discharge of air and feces burst forth from the wound, in immense quantity, to his immediate relief. His pulse rose, a comfortable warmth succeeded, his stomach became settled, and his hiccough left him; in short, every prospect brightened, and from that day each symptom became more promising. On the tenth day, the parts looked so well and healthy, that Mr. NAYLER, hoping there was still a possibility of diverting this most loathsome evacuation from the groin into its natural channel, by another attempt to procure an union of the divided portion, once more brought the extremities together by suture. Unfortunately, this likewise failed in the extent proposed, most of the stitches giving way to the continual pressure to which they were exposed." The feces then came entirely by the wound; but some time afterwards, on applying pressure to it, a natural inclination for a stool was felt, and it was found, that by the application of a truss to the part, the escape of the alimentary contents could be almost entirely prevented. It appears, that the two ends of the gut were united by a surrounding common cavity, in

the manner that will be more fully described presently; and that the contents were transmitted from one to the other through this, when the deficiency in the external part, that ought to have been filled up by the curative process, was supplied by artificial means.

SIR A. COOPER* has mentioned two other instances, in which suture of the intestine was practised. In one of these the feces came through the wound, from the time of the operation; in the other no discharge took place, either per anum or through the groin, till some time after the operation, when an evacuation through the wound greatly relieved the patient. The same practice was attended with no better success in the hands of BARON BOYER†. After removing four inches of mortified intestine,

* *On Crural and Umbilical Hernia*, p. 30 and 31.

† HEYLIGERS in *Mem. de la Société Med. d'Emulation*, tom. i., p. 127.

The particulars of this case, as related by BARON BOYER himself in his *Traité des Mal. Chir.*, are interesting in many points. At the time of the operation BOYER divided the intestine, which was decidedly mortified in an extent of four inches, and thus allowed the escape of its contents, to the great relief of the patient. He gave mild opening medicine to unload the bowels, and also to enable him to distinguish the upper end of the gut, which however was sufficiently obvious from its considerable dilatation. On the next day he cut away the mortified part, and united the two ends, according to the method of RAMDOHR, introducing the superior, supported by a cylinder of card, into the inferior; which process he says was very long, tedious, and extremely painful in its execution. When it was finished, he could not return the gut, distended as it was by the card, without a considerable enlarge-

he introduced the upper into the lower extremity over a cylinder of card. The manœuvre was very difficult; and the return of the part, when thus distended by the foreign body, required a further incision of the ring. The patient, who before had been tolerably easy, was now attacked with the most severe pain, which continued for sixteen hours, when he expired.

Some instances are recorded, in which wounds of the intestine have been successfully closed by suture. Thus, in the case of a protrusion of the small intestine, presenting an aperture that would admit the finger, the latter was united by an uninterrupted suture, and the bowel returned*. The alvine discharge was natural, and the patient well in six weeks. A wound of the colon in a young man eighteen years of age was closed by the glover's suture, and the patient got well†. In another case the wounds of the intestine were closed in the same way, with a

ment of the ring. The patient grew decidedly worse during this second operation; the symptoms of strangulation, which had been removed by the free issue of fecal matter through the morbid intestine, were renewed, and destroyed the patient in sixteen hours. Tom. viii, p. 169.

.. PLOUCQUET'S *Bibliotheca* affords the following notice of an unfortunate case. "Infauste tentata reunio marginum intestini sphacelati rescissi per chartam vernice obductam." AYRER in LODER'S *Journal für Chirurgie, &c.* v. i, p. 526; and SCARPA quotes another from the *Annales de Litterature Med. Etrangère*, Avril, 1809, p. 320.

* *Philos. Trans.* vol. 1, p. 35.

† GJANDORP, *Speculum Chirurgorum*, Obs. 34.

fortunate result*. A complete division of the ileum, in which the wound extended into the mesentery, was treated in the same way. The ends of the divided bowel were united by four ligatures of double silk, passed through all the coats, and drawn tightly, the ends being then cut close to the knots, and the part returned, together with a large portion of the intestinal canal, mesentery, omentum, and stomach, which had been protruded at the same time. The judicious conduct of the surgeon saved the patient, though with difficulty, from this extensive and complicated injury†.

If the instances of success in the employment of sutures for wounds of the intestine were much more numerous than they are, they would not induce us to adopt the same practice in mortified herniæ. In the former case the healthy state of the gut, of the abdominal cavity, and of the constitution, justify us in expecting that natural and healthy adhesion, on which the success of the treatment so much depends; and which is so little to be expected where the bowel and peritoneum are highly inflamed, and the constitution much disturbed. In the case of wound, too, the gut is unadherent; while, in these sloughing ruptures, it has contracted connections to the surrounding parts, preparatory to a natural process of cure, and not separable without a dangerous increase of irritation and inflammation.

* *Journal de Med.* de M. LE ROUX, t. xxvi, p. 448.

† *Edinburgh Medical and Surgical Journal*, vol. xii, p. 27, et seq.

Even in wounded intestines we have so many examples of successful result without the employment of sutures, and so few cases in which the favourable termination can be ascribed to them, that the propriety of gastroraphy may be doubted.

“Confiding,” says SCARPA*, “in these principles, deduced from the comparison of penetrating wounds with injury of the large intestine, with the protrusion and wound of the small intestine, I admit the possibility of curing the latter without the assistance of sutures. Nor do I want examples of similar cures, among which I may mention a recent cure of small intestine, protruded and perforated incautiously by a country surgeon, in the act of pushing it into the abdomen with the point of a spindle. In this patient, without the assistance of any suture or ligature passed through the mesentery, the wounded portion of intestine remained in contact with the peritoneum, in the direction of the internal lips of the wound of the abdomen, from which the intestinal matters continued to pass for a long time, and then resumed their natural course, and allowed the external wound to cicatrize. This young man enjoys at present the most perfect health, and does not complain of any inconvenience depending upon the wound he had met with, nor upon the interruption of the passage of the feculent matters along the canal of the small intestine.”

Cases are recorded, in which a complete division

* *Treatise on Hernia*, by WISHART, p. 357.

of the small intestine has terminated favourably under similar treatment *.

If the successful employment of sutures in wounded intestines do not justify us in adopting them in cases of mortified herniæ, still less can we find any argument for their use from experiments on dogs. Many injuries may be inflicted on these animals, with very little ill consequence, that would be most injurious, or even fatal, to the human subject: hence we must be cautious in reasoning from one to the other. The state of the part and of the constitution, in a patient with mortified hernia and in a healthy dog, are so widely different, that all analogy ceases. Yet these researches on animals afford us very interesting information respecting the processes employed by nature, and have clearly established the method that ought to be followed in case suture of the intestine should be ever required. If a portion of the intestinal coats be pinched up with a pair of forceps, and tied tightly with a ligature, of which the ends are cut off close, the gut becomes adherent to some contiguous peritoneal surface, and the included portion, as well as the ligature, fall into the canal. If the edges of a divided gut be approximated by sutures penetrating all the coats and cut close, the wounded bowel becomes included by a deposition of coagulating lymph, which unites its cut edges, so that the division is not visible externally, and the sutures, when

* LARREY *Relation Chirurgicale de l'Armée de l'Orient*, p. 300.

loosened by ulceration, fall into the canal. The same process takes place when the divided ends are united by an uninterrupted suture*.

If then a surgeon were determined to practise gastrotomy in hernia (which however seems to me objectionable in all cases), and should meet with a case that he thinks suitable, the best method would be, to sew the ends together by silk ligatures penetrating all the coats at four or five points, and to cut off the ends close to the knots. Or an uninterrupted suture of fine silk might be used, the end being in like manner cut off close.

When the intestine above and below the mortified part is not adherent (a case which I believe to be extremely rare), LA PEYRONIE has recommended, after the removal of the dead portion, that a ligature should be placed in the mesentery, so as to draw this part into a longitudinal fold, and thereby approximate the two ends of the gut. He fastens this ligature on the outside of the wound, in such a manner as to retain the open extremities near the ring. The successful event of some cases treated on the

* Dr. JOHN THOMSON of Edinburgh first noticed the curious fact of the inclosure of the ligatures by coagulating lymph, and their discharge into the canal. See Sir A. COOPER's *Anatomy, &c. of Inguinal Hernia*, chap. ii; in which both Dr. THOMSON's experiments and some of his own are related. There is an Inaugural Essay on the subject by a Dr. SMITH, published, I believe; in America; but I have not seen it. Mr. TRAVERS's *Inquiry into the Process of Nature in repairing Injuries of the Intestines*, contains the most copious illustration of the whole subject; and is accompanied with plates.

above plan seems to justify the principles on which it is founded*. I have already shown that the ligature in the mesentery is useless. The proposal of LA PEYRONIE discovers an ignorance of the processes followed by nature in such cases: it need not, therefore, be more particularly examined. Its condemnation will be found in the general remarks on the treatment of mortified herniæ.

A different treatment has been proposed by LITRE†; he retained the superior extremity of the intestine in the wound, and tied the lower. This plan has gained the approbation of Mr. LOUIS‡, who considers it as preferable to the proceeding of LA PEYRONIE. I cannot think a surgeon justified in directing his treatment expressly to the formation of an artificial anus, and thereby taking away all chance of that entire recovery, which the powers of nature have accomplished in so many instances. This practice, in its complete success, can only gain the credit of rendering a person disgusting to himself, and to those with whom he associates. It really becomes a question, whether life itself be desirable, if burthened with such an afflicting infirmity as the discharge of the feces through the groin.

* *Mémoires de l'Acad. des Sciences*, année 1723; *Mémoires de l'Acad. de Chir.* tom. i, "Observations avec des reflexions sur la cure des hernies avec gangrene," p. 337.

† *Mémoires de l'Acad. des Sciences*, année 1700.

‡ *Mémoire sur la cure des hernies intestinales avec gangrène*, in the *Mém. de l'Acad. de Chir.* tom. iii.

After thus objecting to the various modes of treatment, which have been proposed for a mortified intestine, it remains for me to mention the conduct which a surgeon should pursue in such a case. It is, to make a free incision through the mortified part, in order to unload the distended intestinal canal: or, if the gut should have already given way, to divide freely the integuments and sac; and to leave the subsequent progress of the cure entirely to nature. In providing, by these measures, for the discharge of the accumulated fecal matter, we only anticipate the relief which nature is hastening to afford, and we disturb none of her operations. The marked benefit experienced by the patient from the removal of this great source of irritation and distress, has been so strongly depicted by all the best observers*, that no doubt can be entertained of the propriety of the treatment. The rest of the cure is accomplished by nature. The sloughs will be cast off; the ends of the gut are retained by the adhesive process in a state of apposition to each other, the most favourable for restoring the course of their contents; the wound contracts, and often completely closes, so that the continuity of the alimentary canal is perfectly re-established. The interference of art

* See the cases quoted below from PETIT; also GOOCH's *Works*, vol. ii, p. 197 et seq.; PELLETAN, *Clinique Chirurgicale*, vol. iii, pp. 90 and 94; HEY's *Practical Observations*, iiii edit., *Appendix*, p. 571; TRAVERS's *Inquiry*, p. 320; SCARPA, mem. iv, § iv, Case of Congenital Hernia, also § xix, Case of Dominico Paoli.

can only be prejudicial in this process. When we consider the loose state of the intestinal canal, in its natural condition, we find a difficulty in conceiving how its continuity can be restored, after considerable portions have perished: yet indubitable proofs of this fact exist, and induce us to place confidence in the resources of nature.

The work of SCARPA* contains the best description of the process, by which restoration is effected, after mortification of the intestine. The peritoneum forming the mouth and neck of the hernial sac becomes connected to the sound portion of the gut, by the adhesive inflammation which precedes the separation of the strictured and mortified part. This adhesion prevents the passage of the intestinal contents into the abdomen, when the slough separates or is divided, and forms a membranous cavity, embracing the two ends of the bowel, by which those contents are conveyed to the external wound. As the lower part of this membranous cavity, which is connected to the wound, contracts in the progress of the cure, the passage of the feces through it is rendered more and more difficult, and they take their course into the lower orifice of the intestine, always open to receive them. Hence we clearly understand how pressure on the external wound always assists the passage of the feces towards the anus; and how, when the external wound is very open, such pressure is absolutely necessary for that purpose. As the cure proceeds, the intestine is gra-

* Mem. iv.

dually retracted towards the abdomen, and draws with it the membranous cavity, elongating it into a kind of funnel-shaped process, of which the upper broad end embraces the orifices of the bowel, while the inferior much narrower portion is continued through the ring, and often terminates externally by a small fistulous orifice. The two ends of the bowel are united at an acute angle in the mouth of the sac; and a projecting ridge is formed at the point of union, which prevents the direct passage from one extremity into the other. When a portion of the whole cylinder has been lost, the two apertures touch each other only by a small part of their circumference; the projecting ridge is considerable, the angle of union acute, and the membranous funnel is not adequate to restore the canal until the ends have been considerably retracted within the abdomen. When a portion only of the diameter has been destroyed, all these circumstances are more favourable.

In a young man, on whom he operated for mortified congenital hernia of the left side, a large loop of ileum was removed, and great relief obtained by the consequent escape of fecal matter. On the forty-second day, after some fluctuation in the alvine discharge, from accidental causes, the cicatrix was complete, except that a few drops of fecal fluid escaped at long intervals, and he left the hospital. In the following year he died of a violent intestinal attack, consequent on repeated irregularities in diet, and particularly after having eaten voraciously of craw-

fish, not well cleaned from the shells and claws. The ileum was found ruptured just above the point of its adhesion to the peritoneum, and much yellowish fluid had escaped by the aperture, in which several portions of shell were engaged. The intestine between the stomach and the groin was distended to three times its natural size; while the inferior part of the canal was much contracted. The two ends of the gut, meeting at an acute angle, were firmly united behind the inguinal ring. "I found," says SCARPA, "that the great sac of the peritoneum had not only become firmly adherent to the portion of the intestinal tube, which had been unaffected by the gangrene behind the inguinal ring, and, properly speaking, in the cavity of the abdomen; but likewise, that this sac of the peritoneum, like a membranous funnel, extended from the cavity of the abdomen, through the inguinal ring, into the fistulous tube, communicating externally by a narrow hole in the groin." "Having divided longitudinally the narrow fistulous canal and the membranous funnel, I saw distinctly, that the two orifices of the intestine had remained parallel, without being at all turned towards each other; and a ridge projected between them, which would have been sufficient of itself to prevent the direct passage of the feces from the superior into the inferior orifice. The alimentary matters must therefore have been poured from the upper end into the membranous funnel, and hence have passed, by a half circle, into the lower end of the intestine. And

it was precisely in this half circle that the shells of the craw-fish had accumulated, so as to obstruct the communication, and occasion the rupture of the intestine*.”

In a second case, of a patient who died some years after recovery from a mortified crural hernia, of which nothing remained but a very small fistulous opening, now and then giving issue to a few drops of fluid, there was reason to suppose that a part only of the diameter had been included; and consequently the angle of union, although strongly enough marked, was not so acute as in the preceding instance. This part was surrounded by a membranous funnel formed by the neck of the hernial sac; but it had been drawn with the intestine into the abdomen, so that, at the time of death, it was several lines above the crural arch. The upper portion of the intestinal canal was much larger than the lower. SCARPA injected water into the former, and expected to see it pass readily into the latter, remembering that the whole diameter had not been intercepted, and that, during life, the intestinal contents had freely pursued the natural course. The fluid, however, met with an obstacle when it arrived at the point where the two portions of intestine were united; and could only pass from the upper to the lower orifice by traversing the membranous funnel, in which it described a semicircle behind the crural arch, causing slight oscillatory motions, that were communicated even to

* Sect iv and v.

the integuments of the groin. The peritoneum formed the membranous funnel, the basis of which inclosed the angle of union of the two ends of the intestine, while the apex passed under the tendon, and terminated at the small fistulous aperture. On slitting open the gut, its orifices, separated by a small eminence formed between them, were found side by side. This eminence, although not so considerable as that observed in the preceding case, and not entirely stopping the direct communication of the two ends, was sufficient to occasion even water, when injected into the gut above, to pass from it into the membranous funnel, and thence into the lower orifice of the intestine*.

The experiments performed on animals have not succeeded in showing the process of restoration followed by nature in mortified hernia, because the essential circumstance, the peritoneal sac, cannot be produced artificially. Mr. TRAVERS's researches, however, have disclosed to us the unexpected and interesting facts, that nature can easily restore the canal in a dog, when it has been interrupted by a

* SCARPA, m. iv, sec. vi ; See also Plate xi for a representation of the facts. Cases of hernia with mortification, which have recovered, and been afterwards examined, are described in the following works. In the angular junction of the two ends of the intestine, in their firm adhesion to the peritoneum lining the parietes, and in the narrowing of the tube, most of these accounts agree with the representations of SCARPA. See *Giornale di Medicina*, tom. vi. *Hist. de la Soc. Roy. de Medecine*; tom. iv, p. 321. The account is accompanied by two figures. The passages cited from the works of DE HAEN and MAU-

ligature encircling its whole circumference, or when a fold is firmly tied, and the strangulated piece cut off below the thread *. The gut becomes adherent to the surrounding peritoneal surfaces; coagulating lymph is effused over the ligature, which, by itself in the one case, and in the other together with the included ends of the bowel, is separated into the canal. The ends of the bowel, divided by the ligature, are retained in apposition by the effused lymph, which, becoming organized, unites them firmly, so that very little appearance of the operation remains externally.

Almost all the numerous instances of recovery from mortified hernia, which are recorded in the annals of surgery, took place where the surgeon was contented to remain a quiet spectator of the process, merely providing for the discharge of the intestinal contents, without interfering with any artificial means of uniting the divided intestine†.

CHART in the note in the next page. MORAND, *sur la réunion des deux bouts d'un intestin, une certaine portion du canal étant détruite*; in the *Mém. de l'Acad. des Sciences*, année 1735. PIPELET, *sur la réunion de l'intestin, qui a souffert déperdition de substance dans une hernie avec gangrene*; in the *Mém. de l'Acad. de Chirurgie*; tom. iv, p. 164; with two figures. A case in which the colon had united after a gun-shot wound, was examined by AMYAND, and exhibited similar appearances. *Philos. Transact.* vol. xxxix, p. 336.

* *Inquiry into the Process of Nature*, &c. pp. 98 and 342.

† PETIT *Traité des Maladies Chirurgicales*, tom. ii, p. 317 et 399; *Supplément au Traité de PETIT*, p. 116; POTT's *Works*, vol. iii, p. 319; AMYAND in the *Philos. Transact.* vol. xxxix. pp.

The following cases are translated from PETIT and SCARPA, as they exhibit the proper method of treating these complaints.

CASE I.

As I was travelling post in Germany I went, while the horses were being changed, into a room, where I perceived an insupportable stench, which I immediately recognized, although it was mingled with several others no less disagreeable. It was a smell of putrefaction or gangrene that I particularly distinguished: and, on inquiring the cause, a female attendant led me to the bedside of an appa-

338 and 341; *Hist. de la Soc. Roy. de Médecine*, tom. iv, p. 321; *Mémoires de l'Académie de Chirurgie*, tom. i, p. 603; tom. iii, pp. 178 et 181; *Mémoires de l'Acad. des Sciences*, année 1723, p. 30; année 1735, p. 249; MAUCHART, *Dissert. Chirurg. de Epiploenteroceles crurali incarceratâ sphacelatâ, &c.* in HALLER'S *Disput. Chirurgic.* tom. iii; HEISTER de *Herniâ incarceratâ suppurata sæpe non lethali*, *ibid*; *Recueil Périodique*, or *Journal de Médecine, Chirurgie, &c.* tom. vi, p. 48; tom. vii, 53, 124; tom. xxiii, p. 274; tom. xxxvi, p. 68; DE HAEN *Rat. Medend.* p. 7, c. iv; WILMER'S *Practical Obs. on Hernia*, p. 82, &c.; GOOCH'S *Surgery*, vol. ii, p. 197 and 203; COOPER on *Inguinal Hernia*, p. 33; and in the Appendix to Mr. HEY'S *Practical Observations*, p. 571.

I have only to remark, that in almost all the instances, recorded in the works now quoted, two or three inches, or still longer portions of the intestinal canal had been destroyed by the mortification; and they all recovered completely. The number of citations might be easily increased, but these are sufficient for my purpose.

rently dying man. The groin and scrotum were in a state of gangrene, and perforated by several openings, giving issue to feces mixed with bile, and containing white clots, which consisted of curdled milk: forming a tout ensemble highly offensive both to the sight and smell. Having removed the filth, cut away the sphacelated skin and membranes, and discovered the spot at which the intestine had given way, I procured, by the introduction of a canula, the discharge of much liquid bilious matter from the intestine above the stricture. The protruded portion of bowel adhered everywhere to the surrounding parts, especially about the ring. I added nothing as an external application to the species of suppurative, which had been already employed; and trusted the rest of the business to nature. Having left directions for the future management of the patient, I promised a visit on my return, to learn the event. I passed through this village, in my way to France, five months after, and found my patient, who had recovered in twenty-eight days, without any fistula, in perfect health.

CASE II.

ON another occasion, as I was going by night to La Ferté-Sous-Jouarre, the postillion lost his way. Perceiving a light in a neighbouring hamlet, I went to the house of a peasant, to inquire the road, and found his wife on the point of death from an intestinal hernia, which had burst in the sac, and had

given issue to a large quantity of fecal matter. Thus at least I inferred from the narrative of the attendant, who informed me, that the swelling had increased in size all at once, and that they had heard at the same time a noise as of water and wind. Being much pressed for time, I contented myself with simply opening the sac, and the bed was immediately inundated with fecal matter; the discharge being at least eight times as much as the tumour could possibly have contained. The patient was greatly relieved, and the belly subsided: I applied to the part nothing more than cloths dipped in a decoction of the herbs used for clysters, of which they had fortunately an abundant provision, directing that the application should be frequently renewed, and that they should be careful in keeping the patient clean.

The husband recompensed my services by conducting the postillion to Jouarre; and I promised to see his wife the next day on my return, but I was unfortunately detained twenty days. The poor man, impatient at my delay, came, on the fifth day, to inform me that his wife continued well, and felt no pain; but that all her stools were discharged through the wound which I had made, and that he knew not with what balm he ought to dress her; he stated further, that the wound, when wiped, appeared clean, but that it was rendered foul by the discharge several times in the day. I recommended a continuation of the same plan, that of applying cloths moistened in the emollient decoction. In six days he again came to La Ferté

and informed me, that his wife had been to stool in the natural way, that the discharge through the wound was very slight, but that she felt excessively hungry: I allowed her a little more soup, and directed a continuation of the same applications. He visited me on the fifteenth day with the intelligence that his wife grew better and better, and that she would not be restrained from satisfying her appetite: the discharge through the wound was in very small quantity, and took place only when she strained in expelling the feces. I ordered a clyster, whenever she felt any inclination to go to stool, in order to dilute the feces, and recommended that she should exert herself as little as possible in their evacuation. On the twenty-second day I set off on my return to Paris, and found the external wound very nearly healed: the opening in the intestine had, in all probability, entirely closed, as no feces had appeared through it for three days. After the expiration of a month I again saw her in Paris, in a state of perfect health: I recommended a truss, in order to prevent any return of the protrusion, which, however, I do not fear so much in cases like the present, as in others*.

CASE III.

IN a case of scrotal hernia, where the mortification had proceeded to considerable extent, “ I performed

* *Tr. des Mal. Chir.* tom. ii, p. 317 — 321.

the operation, after explaining to the relations how much reason there was to fear a fatal event. The exposure of the intestine and omentum was attended with no pain: the former, which consisted of ileum, had not given way, although the strangulation was of nine days' standing. After a short deliberation, I determined to make an opening of an inch in length in the mortified intestine, and fixed on the middle of the protruded part for the situation of the incision. A very copious discharge ensued, from which the patient experienced great relief. I terminated the operation here, not thinking it advisable to dilate the ring, when there were no sound parts to be returned, and the contents of the intestines were discharged with facility; and covered the parts with cloths dipped in the emollient decoction. At the end of five hours the tumefaction had nearly subsided: the patient passed an easy night, and the discharge through the wound was inconsiderable, probably because the stomach and intestines were already completely emptied. On the 2d day a manifest line of separation appeared between the living and dead portions, which induced me to remove a considerable proportion of the latter. I still left a part, under the idea that it might retain the ends of the sound gut out of the abdomen, and afford an opportunity of attaching ligatures with the same object; for I had hitherto not perceived that the sound portion had contracted any adhesion to the ring. Suppuration commenced on the fourth day; and the ends of the intestine, attached by the

ligatures, began to separate : but, as I found that the gut adhered slightly to the ring, and as it had kept its place, since the operation, without any disposition to withdraw into the abdomen, I made no change in the manner of dressing. The mortified ends of the intestine came away on the fifth and sixth days, and the omentum separated in two days afterwards : the whole wound now looked red and healthy, and granulations appeared on the protruded parts, continuous with those formed in the neighbourhood of the ring, and by the integuments. The treatment was still confined simply to cleaning away the discharge, and applying cloths dipped in the emollient decoction. As the patient was weakened by the severe regimen, I added the yolk of an egg to his jelly ; on the fifteenth, I increased the quantity of the latter, and allowed another yolk, giving him leave also, when thirsty, to take a few spoonfuls of decoction of *dogs-tooth* (dogs-grass, couch-grass). Hitherto nothing had passed into the intestines below the hernia, and I ventured to give him half a clyster, which he retained. As he felt some rumbling in the bowels on the next day, I ordered a whole clyster of the emollient decoction, with two spoonfuls of oil : this came away at the end of six hours, with some hard balls of fecal matter, which must probably have remained in the large intestines since the commencement of the strangulation. On the following days he only took half clysters, which being retained, I gave him another whole one : this brought away some scybala,

together with much bile ; and hence I concluded that something had passed through the small into the large intestines ; that the divided ends were beginning to unite, and thereby re-establish the natural course of the feces. From this time I had the satisfaction to observe a daily diminution in the quantity of fecal matter discharged through the wound, and to perceive that the half clysters, which were still continued, facilitated the evacuation per anum*.

CASE IV†.

“ DOMINICO PAOLI, twenty-five years of age, was operated on by me for a gangrened scrotal hernia of the left side. As soon as I had made an incision into the lower mortified part of the small intestine, and removed the immediate cause of the strangulation, a great quantity of fluid matter was discharged from the wound, followed by several lumbrici, with great relief to the patient. On the gangrened parts being separated by the efforts of nature, the orifices of the divided intestine and the neck of the hernial sac retired beyond the inguinal ring, and the cure went on daily very favourably. After some weeks the feces resumed their natural course, the wound contracted, and only transmitted at long intervals a very little thin, yellowish, feculent matter, through a small opening in the centre of the wound ; in

* *Tr. des Mal. Chir.* tom. ii, p. 399 — 403.

† SCARPA by WISHART, p. 339.

which state the patient left the hospital. He remained very well for three years; for neither the labours of the country, nor the coarse diet, caused any considerable pains in his belly, nor retarded the alvine excretions."

In support of the practice here recommended, I can adduce the opinions of three celebrated men, whose acknowledged abilities and extensive experience entitle them to the greatest attention. My readers will be satisfied on this point, when I mention the names of J. L. PETIT, RICHTER, and SCARPA.

After mentioning a valuable and instructive case, PETIT proceeds, "Cette observation, et quelques autres, que j'ai rapportées ci-dessus, prouvent bien que les guerisons, qui paroissent miraculeuses, sont dûes à la nature plus qu'à l'art. Heureux les malades qui tombent entre les mains des chirurgiens bien convaincus de cette vérité: ceux-ci s'attacheront seulement à éloigner tout ce qu'ils croiront pouvoir troubler ou interrompre la nature de ces fonctions, et n'en auront pas moins de gloire*."

"There can be no doubt," says RICHTER, in his Elements of Surgery, "that the surgeon acts most prudently in leaving the union of a divided intestine entirely to nature; and that all the artificial methods, which have been hitherto recommended, are much

* *Traité des Mal. Chir.* tom. ii, p. 403, 404.

better calculated to disturb, than to aid, her salutary operations*.”

SCARPA† observes, “ We see almost daily, that nature, by her own powers, and with wonderful simplicity, effects mildly such sort of cures, preparing herself, to use the expression, for the process, by making the adhesion of the sound portion of the intestine to the neck of the hernial sac precede the gangrene of the strangulated intestine; then, on the separation of the gangrened parts, by retracting towards the cavity of the abdomen the divided extremities of the intestine, together with the remains of the neck of the hernial sac, by means of this membranous funnel it at first directs the feculent matter by the wound, then forms of it a passage or depôt, within which the feculent matter, poured from the superior orifice of the intestine, making a half circle, passes into its lower aperture. For two or three cases of the fortunate event of RAMDOHR’S operation, there are now innumerable cases recorded of complete cures effected by nature, without the intervention of art; on which account, at the present day those patients may be considered fortunate, who, in such very urgent circumstances, fall into the hands of surgeons who have not the mania of operating, and are not too anxious to close the fecal fistula.”

* *Anfangsgründe der Wundarzneykunst*, vol. v, p. 346.

† English translation of Mr. WISHART, p. 353.

A few observations only are necessary on the general management of patients labouring under mortified herniæ. The urgent necessity of relieving the distended and inflamed intestinal canal, the utility of mild purgatives and clysters, and the propriety of a strict attention to diet, have been already pointed out. The latter should not be particularly small in quantity; but soft, easily digestible, and nutritious. The powers of the patient are sometimes so reduced by the disease, that he requires to be supported by the most nourishing kind of food; here strong soups, and broths, sago, &c., and even wine may be necessary. Bark and cordial medicines may be combined with these. A common poultice, with occasional fomentations, constitutes the best local application; the necessary attention to cleanliness requires that it should be often renewed. When the sloughs have separated, and the dimensions of the wound have diminished, its entire closure may be favoured by approximating the edges with sticking plaister, and making pressure on the part.

If an opening should unfortunately be made in the intestine, in consequence of a rupture being mistaken for a bubo, the treatment will be the same as when the gut has mortified. "I was lately concerned," says GOOCH*, "for an elderly man, who had a bubonocèle inadvertently opened for an abscess, and who, by such kind of treatment as advised in

* *Works*, ii, 202. See also *Mem. de l'Acad. de Chir.* t. iii, p. 173: and t. v, p. 597.

the preceding case (a hernia with gangrene of the intestine, recovered by laxative medicines and clysters, with a restriction to liquid food), was completely cured. And many years ago I was an eye witness to such a happy event, or accidental cure, in an old woman who had a femoral hernia incautiously opened just beneath POUPART'S ligament."

Worms have been discharged, in several cases, through abscesses, from the intestines contained in ruptures. The surgical treatment would be the same here as where the bowels are perforated in consequence of mortification.

The patient, who has recovered from a mortified hernia, with the natural passage of the feces restored, still remains exposed to considerable danger from disorder of the bowels*. The dimensions of the intestinal canal are almost always diminished, and sometimes very considerably so, at the part affected; and the transmission of the contents experiences the further obstacle afforded by the projecting ridge of the angle of union between the ends of the gut, and the consequent indirect passage between these*. Hence the strictest attention is ne-

* In a case recorded by MR. A. BURNS, of crural hernia, which occurred during parturition, proceeded to mortification with external discharge of the intestinal contents, and then slowly but completely healed in the course of two months, the patient subsequently died of inflammation of the bowels. Examination disclosed, besides the usual appearances of peritonitis, the following circumstances. "Above the middle of the ilion, the canal of the gut was much enlarged, and the coats of the intestine were considerably thickened. Below this point, the diameter of the

cessary to the quality and quantity of food, and to the regular evacuation of its fecal residue. Direct obstruction from hard, indigestible, and unwholesome food has caused the cicatrix to give way, and thus renewed the discharge of feces from the wound *; the same effect has arisen from indigestion or costiveness. The gut has been known to burst at the point of union, long after the complete recovery, and death has been the consequence †. A patient,

gut was much reduced. Between the dilated and contracted parts of the gut, a portion of the ilion had protruded through the left crural foramen, along with a portion of thickened omentum, which lay behind the intestine. The whole diameter of the gut was not displaced; about four-fifths of it however were protruded: hence the direct passage, from the part of the intestine above the protrusion into the part below it, was not larger than the diameter of a goose-quill. Just in contact with the herniated portion of the gut, the upper end was ruptured. Through this vent, which was a few lines in length, the feculent matter, which was found in the pelvis, had escaped." *Monro, Morbid Anat. of the Gullet, &c.* p. 399.

* *Recueil Periodique, or Journal de Medecine, Chirurgie, &c.* tom. vi, p. 48. A patient had completely recovered from mortification of the bowel, when an obstruction took place, which caused the cicatrix to give way. The natural passage was soon re-established. A similar case will be found in the *Journal de CORVISART, &c.* tom. xxv, p. 169. Another person, whose case is recorded in the *Hist. de la Soc. Roy. de Medecine*, tom. iv, p. 321, survived the operation eight years. During this time the cicatrix gave way and closed again many times. The last attack of this kind was fatal.

† The patient, on whom LA PEYRONIE first tried his method, was subject after his recovery to a colic, of which he died. *Acad. des Sciences*, an. 1723. In a second case, where the opening

under these circumstances, might perhaps be relieved, if the surgeon were bold enough to under-

closed at the end of four months, an abscess formed afterwards under the cicatrix, and discharged some fluid fecal matter, and a small bone. This healed in two months; but the man was afterwards subject to colic. *Acad. de Chir.* tom. i, p. 341. A third patient of the same surgeon, after losing two inches of intestine, had completely recovered at the end of a month, chiefly, as it should appear, by means of a very strict regimen. In two months some attacks of colic were experienced; the last and most severe of which was accompanied by very violent vomiting. An acute pain was felt at the cicatrix; the abdomen swelled, and became painful, and death followed on the second day. Examination showed, that the intestine had burst, and given issue to fecal matter, which filled the abdomen; *ibid*, p. 343. A similar example is related in the 3d vol. of the *Memoires de l'Acad. de Chir.* p. 163; and another by MORAND in the *Acad. des Sciences*, an. 1735. RICHTER saw a patient die suddenly a few weeks after the cure of a mortified hernia. The intestine was detached from the peritoneum, and perforated by a round hole; the abdomen being filled with effused alimentary substance. *Traité des Hernies*, p. 153.

A patient of SCARPA's died a year after his recovery from mortified hernia, in consequence of eating a large quantity of crayfish. The gut burst from an obstruction of the part; p. 255. The case is related in the present section, p. 328.

In a case of crural hernia by PELLETAN, obstruction took place from indigestion: a tumour formed and burst, and the fistula afterwards closed. *Clinique Chirurgicale*, tom. iii, p. 60.

In another case (of crural hernia with mortification) the natural course of the feces was never re-established. It was nearly restored, when indulgence in eating brought on obstruction, which was overcome. By rigorous diet, &c., the issue of feces was again lessened; but a second indulgence produced a fatal obstruction. The adhesion of the gut gave way, and the matters were effused into the abdomen; *ibid*, p. 94.

take a hazardous operation. It would be right to cut down on the part, and freely open the membranous funnel, which unites the ends of the intestine. This is the spot in which the obstruction occurs. In a person who had recovered from a mortified hernia, the feces ceased to pass per anum; nor could any stools be procured: the belly became distended. The surgeon made an incision into what he calls the distended intestine, which must have been the membranous cavity connecting the two ends of the bowel: he was thus enabled to introduce his finger and extract a hard substance, formed on a nucleus of a plumstone, with kernels and skin of apples. The patient was greatly relieved and soon recovered*.

SECTION V.

Artificial Anus†.

THE action of the whole alimentary canal on the food is not essential to the continuance of life; and its different parts are not, in this point of view, of equal importance. The process of digestion in the

* *Journal de Medecine, Chirurgie, Pharmacie, &c.* de M. LE ROUX, for June, 1787, tom. lxxi, p. 547. The case is annexed by the French translator of RICHTER to the *Traité des Hernies*, p. 306; and it will also be found in SCARPA, Mem. 4, § 20; and in BOYER, *Traité des Mal. Chir.* tom. viii, p. 179.

† The *Mémoire sur les anus contre nature*, contained in the 2d volume of the *Œuvres Chirurgicales* of DESAULT, gives an excellent account of this subject.

stomach, the separation of the nutritive from the excrementitious parts, and the absorption of the former in the small intestine are indispensable ; but the large intestine seems to be little more than an excretory tube for the evacuation of the feces ; and the entire cessation of its functions produces no material ill consequence. . Hence, the prospect of recovery, when the continuity of the intestine cannot be restored, depends entirely on the situation of the unnatural opening ; is greater in proportion as that is nearer to the inferior end of the canal, and smaller as it approximates to the stomach.

The sides of the aperture in the intestine become consolidated to the circumference of the opening in the abdominal parietes, and the cicatrix renders this union very firm. Thus the most effectual barrier is opposed to the effusion of the intestinal contents into the abdomen. If the process of restoration, described in the two preceding sections, should not be completed, in consequence of the ends of the gut being united at too acute an angle, not being properly situated with respect to each other, or not sufficiently retracted towards the abdomen to allow the contents to pass from one to the other through the membranous funnel, the feces must find their way through the wound. Artificial anus is much less susceptible of cure, when it follows wounds of the abdomen, than herniæ. In the former case the gut becomes adherent to the external wound, and cannot be drawn into the abdomen. In the latter it is generally united to the hernial sac, which forms the

connecting membranous funnel between the two ends*; although, in some instances, the same process has occurred as in artificial anus after wounds. Hence the essential circumstances of the case consist in an unnatural fistulous opening affording a ready discharge to the intestinal contents: and in an obstacle, which prevents them from taking their ordinary course. The contraction of the tube below the new anus, where it is no longer distended as in its natural state, is a consequence of the complaint favourable to its continuance. Some have asserted that this contraction proceeds even to obliteration. But this is supported neither by facts nor analogy. The mucous fluid, secreted by the internal membrane, and occasionally voided per anum, would maintain the tube; and the protrusion of the gut from the wound in an inverted state sufficiently proves that it is still hollow. Dissection confirms these arguments, as no instance of obliteration has been recorded.

When the new opening occurs near to the stomach, the food is not submitted for a sufficiently long time to the action of the digestive organs, and it escapes in a half digested state: nutrition is very incompletely performed; and we shall not be surprised at finding the patient become thin and weak, and perish from inanition. (*See the cases quoted in the preceding section, p. 307*). The matters voided in such cases are not fetid. If the fistulous aperture

* SCARPA, m. iv, sect. xii.

should be in the lower part of the ileum, in the cæcum, or colon, the danger is much diminished. The patient can exercise all his functions, and, with the exception of intestinal affections, to which he will probably be subject, his health and strength are not impaired. Here the evacuations are more fetid, as they have been longer retained. In both cases they pass off involuntarily, since the opening has no sphincter to retain them : and this causes a constant uncleanness of the surrounding parts, which can be but imperfectly remedied, with painful excoriation, and the most annoying inconvenience. Generally no feces pass by the anus ; but the mucous secretions of the large intestine are occasionally voided, of a whitish colour, and various consistence. DESAULT observed a case in which these evacuations amounted to a considerable quantity.

A singular case is described by my much valued friend, Dr. Cheston* of Gloucester ; where the feces are not discharged through the wound, although there is an opening in the intestine. The latter part can be seen at the bottom of the wound, with its two ends at a distance from each other. The superior extremity propels its contents towards the inferior, which absorbs them : and this process is carried on so perfectly, under the application of external pressure, which has the effect of completing the canal, that nothing escapes. The process, by which the

* See the first part of Sir A. COOPER's work, p. 36.

canal is restored, and the injurious effects of suture of the intestine are strikingly illustrated by this very instructive case ; of which further particulars will be found at p. 317.

It will be understood, from the preceding section, that the event of cases, in which the intestine is mortified, can be very little affected by direct surgical interference, except in making such openings as are necessary for relieving the distended canal ; and that our efforts should be employed, as far as they can produce any effect at all, in favouring the restoration of the tube. We cannot prevent the formation of an artificial anus, although it is contrary to our intentions ; yet, when the continuity of the canal cannot be restored, the artificial opening is the only means of preserving life.

I have already noticed the different views of this subject exhibited by Messrs. LITTRE and LOUIS. The former, after removing the gangrened part of the intestine, fixed its upper extremity to the wound by sutures, and tied the lower. This method is defended by the latter in his valuable paper on the cure of herniæ with mortification, when the intestine is not adherent. He objects to the plan of LA PEYRONIE from the unfortunate cases, in which the intestine has given way after an apparently perfect cure ; and considers, that the disadvantages of the artificial anus have been overrated. The feces, he observes, must be voided *somewhere* ; and the only difference is in situation. External compression

will supply the place of a sphincter muscle, and retain the intestinal contents until their evacuation can be conveniently effected. The latter observation is not correct: the feces cannot be retained: and, however ingeniously the case may be palliated, it must be still regarded as one of the most distressing infirmities with which a person can be afflicted. If the complaint terminates in the formation of an artificial anus, we must endeavour to alleviate those inconveniences, which arise from the involuntary discharge of wind and feces through the new opening, by supplying the patient with an apparatus, in which these may be received, as they pass off. A receptacle of leather or horn, with its opening placed against the part, and connected to a strap going round the body, has been generally employed*. JUVILLE† delineates a complicated apparatus, the construction of which appears more perfect than that of any contrivance hitherto described. An ordinary inguinal truss is made with an ivory pad, perforated in its middle, so as to fit the opening. A tube of elastic gum, furnished with a valve opening downward, leads from this perfora-

*. Such are described by FUNN, in the *Haarlem Transactions*, vol. i; and by LE BLANC, *précis d'opérations*, tom. ii, p. 460. In a case related by MOSCATI, where the new anus was under the right hypochondrium, the feces were received in a tin box from a leaden canula left permanently in the opening. *Mem. de l'Acad. de Chirurg.* tom. iii, p. 177.

† *Tr. des band. herniaires*, sect. viii, pl. vii and viii. It is also described in RICHTER, *Tr. des H.* p. 169; and with figures in his *Anfangsgründe der Wundarzneykunst*, vol. v, § 427.

tion to a receiver of silver, which is attached by a screw to the lower end of the tube, and lies against the inside of the thigh. The silver vessel may be unscrewed and emptied without disturbing the rest of the instrument. One or two inconveniences might be anticipated from the construction of this pad; that it would either admit the escape of some matters, or produce too much pressure. It seems to have answered well in one instance under the observation of SABATIER, to whom it was referred for examination by the Academy of Surgery. After it had been used for four months, by a patient at the Hotel des Invalides, he gave a very favourable certificate* of its effects in removing the inconveniences arising from the discharge of the feces, and enabling the patient to follow his ordinary occupations. A common elastic truss, with a compress of linen under the pad, has been found in some instances more serviceable than any complicated instrument, in preventing the continual flow of feculent matter from the artificial opening†; and the employment of a piece of sponge‡ has been suggested with the same view: but it is hardly practicable to remedy this inconvenience altogether. It

* This is seen in the work of JUVILLE quoted above.

† *Parisian Journal*, vol. i, p. 193.

‡ RICHTER, p. 169; LOEFFLER found colic and constipation, with excoriation, produced by this treatment. The fluid retained by the sponge accounts for the latter circumstance. These symptoms ceased when the contents of the bowels were allowed to flow unrestrained. Note d, p. 169 of RICHTER.

is desirable to keep up a constant pressure on the part, in order to prevent any protrusion of the bowel itself; or, what has frequently happened, a new hernia by the side of the former.

“The most effectual means,” says DESAULT*, “of preventing the eversion of the intestine, of keeping the opening sufficiently dilated, putting a stop to tenesmus, and retaining the feces long enough for the nourishment of the body, is to place in the opening a plug of linen, supported by a compress of lint, and a moderately tight bandage. In this method, the parts cannot be injured or bruised, and the contents of the bowels are retained. If a little fluid should escape, the lint will imbibe it. Some restraint is felt at the first employment of this apparatus, and slight colicky pains may be caused by it: but these effects speedily subside.”

SECTION VI.

Radical Cure of the Artificial Anus.

THE course of proceeding now described is merely palliative: we are indebted to the sagacity of DESAULT for attempting, and in one or two instances accomplishing a radical cure. He was aware of the angle formed by the two portions of the intestine, at the point of their division, and that it presents an obstacle to the passage of the intestinal contents greater in proportion as it is more acute. He en-

* *Œuvres Chirurg.* tom. ii, p. 362.

deavoured to remove this obstacle by introducing into the two ends of the bowel long tents, which at the same time dilate the inferior portion, and thus facilitate the passage of air or feces. If, in this way, the angular projection can be effaced, the two ends will so far correspond, that the alimentary matters will find a passage from the superior into the inferior. He placed, at the same time, a plug of linen in the artificial opening, to favour the passage of the feces in their natural course, and also to keep up the bowel, when, after having suffered prolapsus or invagination, it had been restored to its proper situation. As soon as the passage of natural stools indicated that the projecting angle was sufficiently reduced, he discontinued the long tents, and retained merely the linen plug, taking care that it should not penetrate too deeply. If this plan succeed, its effects are indicated by the passage per anum, first of air, and then of feces; as the latter increases, the external opening will contract. The use of laxatives and clysters, and a strict regimen, will facilitate the cure. The following example, in which DESAULT practised his method with complete success, is so interesting, that I insert the whole narrative.

“ FRANCIS VIALTER, a sailor, and native of Moulins, was wounded by the bursting of a bomb in the month of May, 1786. He became insensible, and continued in that state for three hours after the battle. The wound was on the right side, and ex-

tended from two inches above the abdominal ring to the bottom of the scrotum, where it had exposed the testicle. A portion of intestine, an inch in length, and divided, appeared at the upper part; and was withdrawn into the abdomen, during the washing of the wound. An opening was left in the dressings, in this situation, for the escape of the feces. He was received into the marine hospital at Brest, a month after the accident, and continued there until he was cured; if indeed that can be called a cure, which left him with a piece of intestine hanging out of the abdomen, and constantly discharging half digested food.

“In this miserable state he worked his way on foot to the place of his nativity. Finding that his friends could not furnish him with the means of subsistence, and that the exertions and fatigues of the journey had greatly elongated the protruded intestine, he visited, successively, the chief hospitals of Europe, in the vain hope of obtaining relief from his loathsome infirmity. After wandering about in this way for four years, he was received into the Hôtel Dieu, at Paris, on the 29th of September, 1790.

“The protrusion had acquired a considerable bulk. Its form was nearly conical, and it measured nine inches in length: the middle and anterior part was very prominent. Its basis, rather contracted, appeared to proceed from beneath a fold of the skin just above the ring; the apex reached to the middle of the thigh, and possessed a small opening, through which the feces issued. Nothing had

passed per anum since the period of the wound except a little whitish matter, at intervals of three or four months. The surface of the swelling was everywhere red and folded; and these folds, resembling the valvular productions of the mucous membrane, were particularly conspicuous below. A smaller swelling, similar to the former in color and consistence, and arising from the same opening was placed externally to it. This had an oval form and a puckered orifice discharging a little serous fluid. Both possessed a kind of peristaltic motion which could be excited by throwing a few drops of water on them.

“This unfortunate young man was of a large and strong frame, but extremely thin, and forced, by the constant dragging which he experienced in the abdomen, to keep his trunk curved, in which position he could walk supported by two crutches. An earthen pot, suspended between the thighs, received the intestinal discharge, which acquired very soon an insupportable feter.

“It was soon ascertained, that the largest tumor consisted of the end of the intestine, next to the stomach, in an inverted state; that the smaller was produced in like manner from the lower extremity of the bowel; and that the edges of the wounded tube were adherent to the opening in the abdominal parietes, forming with them a common cicatrix.

“The depending situation, the exposure to the air, and the irritation produced by the rubbing of the patient's dress, and the constant contact of the dis-

charged matters, had considerably thickened and indurated the parts. Yet DESAULT found that pressure by both the hands, continued for a few minutes, considerably diminished the swelling. He covered the whole, excepting the opening at its apex, with a simple bandage, carried round circularly from below upwards; and this had become so loose on the evening of the same day, that a renewed application was necessary. A similar renewal was practised, as the part diminished; and on the fourth day the intestine seemed reduced to its natural size. DESAULT now accomplished the entire reduction by introducing his finger into the opening, and pushing it upwards, so as to destroy the inversion. The smaller tumour presented no difficulty.

“The patient’s condition was already much improved by the return of the swellings. A thick tent of linen, three inches in length, was introduced into the intestine, and maintained there by a proper bandage. DESAULT proposed to remove this twice a day for the evacuation of the feces; but, after some noise in the bowels, accompanied with an acute sense of heat, wind passed by the anus. Colicky sensations and twitching pains in the rectum followed; and half a pint of fluid matter was discharged through the rectum. Eight evacuations of the same kind, preceded by similar feelings, took place during the night, and made the patient rather weak. The stools were very numerous the three following days; but they gradually became thicker,

and diminished in number. The linen tent was discontinued on the eighth day, and the opening was closed by lint and compresses, supported by truss with a broad and flat pad. This plan entirely prevented the escape of fecal matter by the wound.

“The young man quickly recovered. He regained his strength, and grew fat, although he ate only one third of the quantity, which he consumed before. During two months, which he spent in the hospital after this time, in order to ensure so extraordinary a cure, the fecal discharge was perfectly natural, and no inconvenience was felt. A very trivial serous exudation could hardly be said to stain a small bit of lint placed on the fistulous aperture.

“This patient was travelling about for five months after he left the hospital, executing all his functions in the most healthy manner, and performing even violent exercises. In endeavouring for a wager to lift a cask on his shoulders, his bandage broke; but as he felt no pain, he did not attend particularly to the circumstance, and proceeded to accomplish the feat he had undertaken. He continued walking for two hours, after applying his pocket handkerchief as a bandage. The intestine was again protruded, to the length of six inches, through the opening in the abdomen, which still existed. The same treatment as on the former occasion was again adopted with complete success*.”

* *Œuvres Chirurg.* tom. ii, p. 370 et seq. The case is also related in the *Parisian Journal*, vol. i, p. 178; and another successful instance occurs at p. 370 of the same volume.

The case quoted from SCARPA in the following section affords another example of successful treatment, conducted nearly on the same principles as those laid down by DESAULT.

Dr. BRESCHET* observes, that "this practice of DESAULT is doubtless a natural one; but whilst we approve the proceeding of this celebrated surgeon, let us remember, that it is for the most part inadequate, and that, in the greater number of cases, its good effects are confined to giving relief, without producing a radical cure. DESAULT himself allows that his method fails if the internal angle be too acute; if the two portions of intestine, applied to each other in a parallel manner, have become adherent; and if they are also connected by their extremities to the surrounding parts. He confines the employment of his method to the case of simple lesion of the intestine, without loss of substance, and where there exists a simple fistulous opening. At the same time he allows, that there are no certain means of distinguishing this from all the other lesions that the intestine may present, and in the treatment of which his proceeding would completely fail."

Mr. DUPUYTREN, whose great talents and zeal, and indefatigable activity, render him a worthy successor of DESAULT in the unrivalled field of surgical observation afforded by the Hôtel Dieu of Paris, has lately proposed a very ingenious and more generally applicable mode of radically curing artificial anus,

* *Quarterly Journal of Foreign Medicine and Surgery*, vol. iii, p. 66.

and has succeeded by it in completely relieving some patients from this most loathsome infirmity. He has hitherto published nothing on the subject, himself; but we have two detailed statements of his proceedings; one from Dr. REISINGER*, a very intelligent and well informed German physician, whom I had the pleasure of being acquainted with during his visit to this country; and the other from Dr. BRESCHET†, the very able and well-known director of the dissecting department in the Ecole de Médecine.

The object, to which the efforts of Mr. DUPUYTREN were directed, was to destroy the projecting ridge or band placed at the angle of junction between the upper and lower ends of the bowel, and thus to remove the mechanical obstacle, which prevents the free passage of the intestinal contents from the former into the latter. “The first idea that Professor DUPUYTREN conceived of destroying inter-intestinal septum was to pierce it with a needle, and to

* *Anzeige einer von dem Herrn Professor DUPUYTREN zu Paris erfundenen, und mit dem glücklichsten Erfolge ausgeführten operationsweise zur Heilung des anus artificialis; nebst Bemerkungen von F. REISINGER, Augsburg, 1817*, with an engraving of the instrument employed by Mr. D. An analysis of the work, with a figure of the instrument, may be seen in LANGENBECK, *neue Chirurg. Bibliothek.* b. i, sect. iv.

† *Considerations et observations anatomiques et chirurgicales sur la formation, la disposition, et le traitement des fistules stercorales et des anus contre-nature; par G. BRESCHET, M.D., &c. &c. premiere partie; Quarterly Journal of Foreign Medicine and Surgery; No. ix, seconde Partie, ibid. No. x.*

leave there a loop of thread, a sort of seton, the presence of which would cause adhesive inflammation of the surfaces of the serous membrane; and afterwards, by tightening the loop, to produce the section of the band, as in the treatment of fistula in ano by the ligature. But the parts, being divided slowly and successively, as in the disease last mentioned, united and cicatrized behind the ligature, in proportion as it cut through the septum; the feces did not pass through the opening of the seton, and the aperture made by the latter did not remain fistulous*.”

He then accomplished the destruction of the ridge by embracing it between the two blades of a pair of forceps† constructed for the purpose, and so contrived as to press more and more closely in proportion as the sides of the handles were approximated by a screw. The blades of this instrument are in-

* BRESCHET, in loc. cit. No. ix, p. 82.

† This instrument, which from its effect in cutting through the projecting ridge or septum has been called *Enterotome*, measures two, three, or four inches from the joint to the end of the blades, according to the circumstances of the case. “To prevent it from slipping, and becoming displaced, the corresponding edges of the branches are arranged in such a manner, that one of them, being about a third of a line in thickness, is received, to the depth of a line, in a groove formed in the opposite one, as the cutting edge of a pocket knife fits into the groove of its handle. The male branch is undulated, and terminated by a probe point. The female branch is also undulated on the edges of the groove receiving the male, and the projections on the edge of one branch correspond to the depressions on that of the other. The extremity of the female branch is curved, so as to cover the point of the male like a cap.” BRESCHET, *ibid.* p. 84.

troduced separately, one into each end of the bowel; they are united like the forceps used in midwifery, and then brought together, so as to include between them the projecting ridge, and more or less of the continuation of the bowel, at the part where the two portions lie parallel and contiguous to each other.

The screw of the handle is turned, so as to fix the blades as tightly as the patient can bear; and the pressure is increased from time to time, until the included portion shall have sloughed, and been separated from the sound parts. The portion deprived of its vitality is brought away between the blades in about eight days. Thus a free communication is established between the two ends of the bowel; the natural course of the fecal matter is restored, and an opportunity given for the artificial opening to close.

This method is not adapted to all cases of artificial anus; but to those only, in which the two ends of the bowel lie parallel to each other, or nearly so, which they do in most instances. The first object therefore will be to examine the case carefully, in order to ascertain that point. The introduction of the finger for that purpose, and indeed the application of the forceps itself, may perhaps require some enlargement of the external wound. The ordinary female catheter is a convenient kind of instrument to pass into the bowel to ascertain its direction; and if we employ one for each end, we shall readily discover the relative course and position of the two portions of intestine.

The blades have been made to embrace a depth of from one to three inches and a half, by Mr. DUPUYTREN: this must be regulated by what we discover on careful examination of the parts. The two ends of the bowel may perhaps be adherent, as well as parallel; and this is the most favourable state. Should they not be adherent, or not to the full extent embraced by the forceps, or not quite parallel, the inflammation excited by the instrument will probably produce adhesive inflammation in their serous membrane, and thus unite them, so as to close the cavity of the abdomen before the separation of the slough. By proceeding slowly we may expect this agglutination to become firmer; and thus we shall avoid exposing the abdominal cavity, which might easily take place if the forceps were so applied as to cut through quickly.

When we consider the structure, functions, and morbid affections of the parts concerned, and the continued severe mechanical irritation to which they are subjected in this mode of treatment, we shall not be surprised at seeing pain and tension of the abdomen, colicky sensations, vomiting, thirst, restlessness, and other indications of intestinal and peritoneal inflammation, follow the application of the instrument.

It will be expedient to prepare the patient by rest in bed for a few days, and attention to diet, as well as to the state of the alimentary canal: after the forceps have been applied, he should be kept perfectly quiet, restricted to light and simple food, and

should employ occasionally mild purgatives by the mouth, and clysters. If the pain and other symptoms cannot be removed by the use of warm cloths or fomentations, the pressure of the forceps must be lessened by means of the screw, and again increased when the patient can bear it.

The successful removal of the part embraced by the forceps, and the consequent establishment of a free communication between the upper and lower ends of the bowel, restore the proper course of the alimentary matter; the stools are voided naturally, and no longer go through the artificial opening, which contracts, but does not entirely close. A small aperture remains, giving passage to a thin yellowish fluid, and sometimes allowing the escape of fecal matter: in short, he has a fecal fistula instead of an artificial anus; and he is a sufficient gainer in the exchange. The difficulty of closing the fistulous aperture is very great; the ingenuity and patience of Mr. DUPUYTREN were severely tried in various contrivances and proceedings for accomplishing this purpose, and he does not seem to have succeeded in all instances. The measures to be adopted for this purpose will vary according to the circumstances of each case.

Cases of artificial anus must, I conceive, be much more numerous in Paris than in London. Mr. DUPUYTREN has tried his method in several instances within a short time. No opportunity has occurred to me of putting it in practice, either at St. Bartholomew's hospital, or elsewhere, for several years; and

I have not heard of its having been employed in one instance in this country.

SECTION VII.

Prolapsus of the Intestine through the Artificial Opening.

IT happens not unfrequently that a prolapsus of the intestine takes place at the artificial anus; as there is no sphincter muscle to prevent this occurrence by its contraction. The tumour thus formed is generally more or less conical, contracted at the basis, and perforated near the apex by an opening, which transmits the alimentary matter, if the protuberance issues from the upper end, and a whitish fluid or clysters, if it comes from the lower extremity of the intestine. The gut is necessarily inverted, so that its mucous membrane constitutes the exterior surface of the tumour; which is consequently moistened by the mucous secretion. The colour of the swelling is red. Usually it is not very sensible. It is small at first, becomes gradually larger, and has been seen to exceed a foot in length*. Its size varies, being larger in the erect position, and after exertion, and smaller when the subject has been quiet in bed: in the latter state indeed it often disappears.

* A protrusion of the colon, measuring sixteen inches in length, is described by SCHACHER in his *Diss. de morbis a situ intestinor. preternat.* in HALLERI *Disp. Chir.* tom. iii, N. 78.

Since the bowel is protruded in these cases through an opening formed by the cicatrix of the wound, and consequently possessing considerable firmness, it may experience pressure when a larger part is forced down. The tumour increases in size, and becomes livid under such circumstances; and the passage of the feces may be interrupted. A slighter degree of pressure continued for a long time may produce thickening of the part; and we can easily conceive, that adhesions, rendering the parts irreducible, may arise from the same cause.

The prolapsus may take place either from the upper or lower end of the intestine, or from both. In the first of these cases the feces pass from the middle and most prominent part of the swelling; in the second from the side of its basis; while in the third there are two swellings; from the centre of one of which the evacuations proceed.

The complaint may come on gradually, and as it were spontaneously; or it may be produced suddenly by any effort, as violent coughing, straining at stool, &c. It does not in general cause any very serious inconvenience, as it can be replaced at pleasure.

CASE I*.

— JEFFERIS, sixty years of age, has voided all his stools through the groin for about seventeen years, and still retains every external appearance of health and activity.

* See pl. 2.





His complaint was a scrotal hernia of the size of a pigeon's egg, before the occurrence of the strangulation, which terminated in mortification. The testis on the same side, and a large portion of the surrounding integuments, were involved in destruction with the hernia. The progress of the case, during the mortification and recovery, presented nothing that requires to be particularly noticed.

He has never worn any truss, nor taken any measures to obviate the inconveniences arising from the discharge of the feces, except that of keeping always a quantity of tow in his breeches.

A prolapsus of the intestine has taken place through the artificial opening. The projecting part varies in length and size at different times. It was four inches long when I saw it; and the basis, which is the largest part, measured nearly six inches in circumference. This prolapsus never recedes entirely, but is sometimes considerably smaller. It has occasionally protruded to the length of eight or ten inches, being at the same time equal in size to the fore-arm, and bleeding copiously. This is attended with great pain, and only happens when the bowels are much disordered. Warm fomentations, and a recumbent position, relieve in this case, by causing the gut to return.

The projecting part is of an uniform red colour, similar to that of florid and healthy granulations. The surface, although wrinkled and irregular, is smooth, and lubricated by a mucous secretion. It feels firm and fleshy, and can be squeezed and

handled without exciting pain: it approaches on the whole to a cylindrical form, and its anterior or loose extremity contains the opening through which the stools are voided. The basis of the swelling appears to be continuous on all sides with the integuments, and I could discover no opening of the lower end of the gut.

This person does not possess the slightest power of holding the stools. They are often voided very suddenly, and, to use his own expression, without giving him any notice. When the feces are fluid, which is generally the case, they come away repeatedly in the day, and are discharged with considerable force: but when they are of a more firm consistence, there is not more than one stool in one or two days, and their expulsion requires much straining. At these times their size is not greater than that of the little finger.

Whenever the urine is retained, after an inclination to void it has been felt, a quantity of clear inoffensive mucus, like the white of an egg, amounting to about four ounces, is expelled from the anus, and this may occur two or three times in the day.

He does not confine himself to any particular diet. When he is purged, the food frequently passes with very little alteration; this he has noticed particularly of cucumber. He experiences great weakness at such times. Ale will sometimes pass off in five minutes from the time of drinking, having apparently undergone little or no alteration.

The bowels are strongly affected by slight doses

of purgatives. A quantity of rhubarb, sufficient to cover the finger nail, will purge for three or four days.

CASE II.

THE first opportunity which I had, of observing this affection, occurred, says SABATIER*, some years ago in a young man, who had an artificial anus about the middle of the right hypochondrium. There was a round opening about an inch in diameter, and a somewhat soft and red tumour, equal in size to the fist. The latter had its origin within the aperture, was surmounted irregularly with small tubercles, rather larger than hempseeds, and covered with a mucous fluid. The feces are discharged at its basis, in a liquid and inodorous state. The complaint had subsisted from the age of nine months; nothing coming per anum, except a very little hardened matter of a white colour. The tumour was of more recent date, and was increasing in size. It gave him no pain, although exposed to the air, and frequently washed with cold water. Liquids appeared through the wound unaltered, very soon after they had been swallowed. Pressure occasioned considerable pain. This young man, being prevented by his infirmity from engaging in laborious employments, derived his subsistence from begging in the high road of Antoni, near Verrieres. He is now in Paris, where I have frequently seen

* *Mém. sur les anus contre nature ; Mem. de l'Acad. de Chir.* tom. v, p. 592. The case is at p. 599.

him, and find no alteration in his complaint, except that the tumour is elongated.

CASE III*.

IN a soldier, who was operated on for an inguinal hernia of the right side, the excrements passed partly through the wound and partly through the anus. The former, for what motives we cannot conjecture, was kept open by means of a tent introduced at each dressing: and at last the whole of the excrement, excepting a very small quantity at distant periods, came by this way. About a year afterwards, he experienced, in the hospital at Toulon, a sudden and severe attack of colic, in consequence of eating some boiled chesnuts. Being obliged to go to bed, he found at the wound a red tumour, equal in size to a small nipple: this increased very rapidly to the bulk of the fist. The pains in the abdomen were considerable, and the part grew livid. He was relieved from this attack, a few thin eschars separating from the swelling, at the basis of which the feces continued to be discharged. The prolapsus varies much in size; is ordinarily about six inches long, and one and a half in diameter; and exhibits, very clearly, the folds and glands of the intestine. It is not painful. The feces flow constantly from its basis in a fluid state, without the patient being conscious of their discharge. Small hard lumps, resembling fat in

* Ibid. p. 600.

appearance, are occasionally expelled from the rectum. The patient is in a good state of health, and tolerably lusty and strong.

In the two following cases there was a double protrusion; and a similar instance is related by FABRICIUS HILDANUS*.

CASE IV †.

A SOLDIER, twenty years of age, received a sword wound at the battle of Ramilies, under the ribs of the left side. This was extensively dilated; and the appearance of excrement on the following day showed that the intestine had been injured. He was confined in his diet to broth with an egg, which was discharged through the wound between one and two hours after being swallowed. He felt extreme hunger, and was clandestinely supplied by a fellow soldier, at the end of ten days, with bread and meat, which he devoured greedily, and retained for ten hours. After the wound had cicatrized, and he had left his bed, two protrusions of the bowel took place, and gradually increased to the length of a span. These are connected at their bases, so that they resemble one gut, joined by its broadest part to the

* *Cent. i, obs. 74.*

† ALBINI *Annotat. Academ. lib. ii, cap. viii. De vulnere intestini coli, et quæ id consecuta sunt.* The minute and interesting narrative of this case was drawn up from ALBINUS's own examination, and the history furnished by the patient. A very good representation of the appearances is given in two figures.

belly, and having two loose dependent extremities. They return into the abdomen, when he lies on the right side; and can be very readily pushed up, by introducing the finger into the aperture at their extremities: but the inferior prolapsus does not ever enter completely. When they are replaced, a large opening under the lower ribs leads into the cavity of the colon; and from this the contents of the canal are discharged frequently and involuntarily; less so, however, when the bowel falls down, as the pressure of the cicatrix then retains them in some measure. If he continues in the recumbent position, or if he rises and remains very quiet, the gut does not descend; but coughing or any exertion renews the protrusion. The tumours are red, turgid, and covered with mucus; they become paler, flaccid, and wrinkled when about to pass up. They possess several wartlike prominences, rough, covered with a kind of mucous coat, bleeding when rubbed, disappearing and renewed again in different situations. At one time exposure of the part to cold did not affect it; he had washed it in the waters of the Rhine, when the river was frozen, without inconvenience: latterly, however, cold air coming in contact with the protrusions caused cough. If he did not wash it often enough in hot weather, and was engaged in laborious exertions, a dark and hard mucous and bloody incrustation took place, with pain, loss of appetite and strength: by lying in bed on the right side, the protruded parts would gradually return, and the pellicle could be easily removed,

when they again came down. He had married, and got children: he was robust, when ALBINUS examined him, in the fortieth year of his age. A white mucus was discharged almost daily per anum; and sometimes, particularly if he retained the protrusions within the cavity, a thick tenacious white matter came away with considerable difficulty. He enjoyed the best health when he ate a sufficient quantity to satisfy his appetite. Bread and meat, with a little strong beer, agreed with him best: they were retained nine or ten hours, and always underwent considerable alteration before they were discharged. Bread made of fine flour was the best. Ripe fruits, leguminous, and other fresh vegetables, were hardly retained two hours; they were discharged nearly unchanged, sometimes without loss of colour; and not mixed with the other food. But if much fat or butter were taken with them, they would stay longer; even for three days, in some instances. When he drank too much, the protrusion swelled, and much air and liquid came through the superior portion with the excrement: and liquids taken without solid food would run off in less than two hours.

CASE V*.

AFTER the removal of a portion of colon, in a case of hernia with mortification, an artificial anus remained, through which all the feces were discharged,

* See the Memoir of SABATIER already quoted, p. 618.

excepting some whitish hardened portions, which are still expelled every two or three months. At the end of about eight weeks the intestine protruded through the wound, and a second protrusion appeared in a few days. They were two or three inches in length, and fifteen or sixteen in diameter; and have remained of the same size. Their colour is a deep red, and the surface irregular. They can be easily replaced, without any pain, but the slightest effort is sufficient to renew the protrusion, particularly in the erect position. Clysters injected per anum pass out immediately through the portion which projects from the lower extremity; and vice versa. Messrs. SABATIER, DE LA MARTINIERE, and ANDOUILLE, to whom this person was referred, for the purpose of ascertaining whether a cure could be accomplished, advised him to be contented with palliative measures. He wears a truss with a pad made of box-wood, which confines the protuberance next to the anus. The upper prominence passes through an opening formed in the pad; and a silver tube continued from this aperture conveys the excrement into a box of tin.

The valuable memoir of SABATIER *, from which I have extracted three of the preceding cases, contains two instances related by Mr. PUY of Lyons, in which a strangulated state of the protruded intestine led to a fatal termination. Unfortunately the

* Pp. 622 and 623. See also a fatal case in LE BLANC, *Operations*, tom. ii, p. 445.

parts were not examined after death. The same occurrence was fatal to a patient, whose case is quoted from *Flajani*, in the next section, on *fecal fistula*.

We should endeavour, in cases of artificial anus, to prevent the occurrence of a prolapsus by pressure on the part; and this is more particularly necessary, when a disposition to its formation appears to exist. If the tumour has become irreducible by the hand, its replacement may be attempted by keeping up constant pressure, while the patient at the same time is confined to bed. When it cannot be lessened by this treatment, some contrivance may be adopted to prevent its future increase; and the patient should avoid all those circumstances which are likely to augment the swelling, as great exertions, laborious exercise, irregularity of the bowels, &c. Where pressure of the cicatrix threatens to interrupt entirely the course of the feces, an attempt at relief should be made by dividing the stricture*.

An instructive instance of prolapsus is related by SCARPA; it occurred in the patient whose cure is quoted in this chapter, at p. 339, to illustrate the treatment of hernia, where the intestine has mortified. Having remained well for three years "he was attacked with a violent cough, which troubled him incessantly for several months; after this the small aperture in the centre of the cicatrix began

* This was successfully practised in an instance recorded by SCHMUCKER, *Chir. Wahrnehm.* b. ii.

to enlarge, and then to discharge a greater quantity of feculent matter than usual. Afterwards a small red tubercle protruded at this hole, which gradually increased, so as to form a tumour two inches and a half long, and in breadth equal to such a portion of inverted small intestine. In proportion as this reddish tumour became longer, and projected outwards, the alvine excretions were diminished, and were at last totally interrupted. The patient returned to the hospital in this state. I did not find any difficulty in returning completely the inverted intestine; I then introduced into the fistulous canal a tent of linen about the size of the finger, an inch and a half long, which was directed towards the left side. A few hours after the introduction of the tent, the patient, to my great astonishment, repeatedly went to stool, in spite of the presence of the tent in the fistula, and without previous pains in the abdomen of any consequence. I continued to apply the same dressing for a week, after which I removed the tent, and only placed a common pledget opposite to the orifice of the fistula, trusting that the fistulous canal, when left to itself, would have again contracted so much, as to prevent the inversion of the intestine, as it had done the preceding years. But the case terminated differently; for although the patient was kept constantly in bed, used daily three or four clysters, sometimes stimulant, sometimes emollient, and occasionally a gentle purgative, and was no longer troubled with the cough, yet the fistula did not contract, the alvine discharge again became scanty, and

the intestine was inverted outwardly, as before." The use of the tent produced the same effect as on the former occasion, and it was necessary to wear it constantly. A compress, supported by a T bandage, was found the best means of keeping the tent in its situation. The patient continued to wear it for two years, and went about his ordinary affairs*.

When the prolapsus has been reduced, the case comes under the description of simple artificial anus, and may be treated according to the principles explained in the preceding section.

SECTION VIII.

Fecal Fistula.

It happens sometimes that the wound closes in a case of mortified hernia, with the exception of a small fistulous aperture, through which fecal matter, or a yellow fluid, is discharged in small quantity. Such openings often continue in spite of every attempt to heal them. The complaint differs from the artificial anus only in degree. The stools are evacuated in the natural way, but a small opening still exists, giving issue from time to time to more or less fecal matter. The discharge may be abundant at one time, and then stop for some days: the opening may be closed for a time, and then re-appear. The matter discharged may be a clear yellow

* M. iv, § xix.

fluid, without any fecal smell. Herniæ are not the only causes capable of producing these fistulæ; they may arise also from wounds of the intestine, or after those abscesses through which worms are occasionally discharged.

“I attended a patient,” says MORAND, “in whom the operation for strangulated hernia had been performed; and who voided feces both by the wound and the anus. The discharge by the former passage was gradually reduced to a little yellow serum (*serosité bilieuse*), which the patient continued to pass through a small fistulous opening. I have seen two other instances of the same kind*.”

“A boy, aged thirteen, was admitted into St. Thomas’s hospital, for an irreducible scrotal hernia, from which a quantity of feculent matter was constantly discharging through a small hole in the scrotum. He remembered having accidentally swallowed a pin, and five weeks afterwards his hernia began to swell, and to become very painful. A poultice was applied, and an abscess formed, which soon after burst, and on looking at the orifice by which the matter had discharged, the point of a pin appeared projecting from it, which was easily extracted. A fistulous opening of the intestine remained, for which he was admitted into the hospital. Attempts were made to unite it, by paring off

* *Opuscles*, pt. ii, p. 162.

the edges of the wound, and encouraging adhesion, but without success*.”

In the case of a female, who had a ventral hernia, from which a portion of intestine sloughed, “the wound has since several times healed; but at the interval of a month, and sometimes of six weeks, an abscess forms, and produces a discharge of purulent and feculent matter for four or five days, when the wound again closes; and in this way she has been teased for many years †.”

In treating these fistulæ, we should endeavour, by accelerating the passage of the intestinal contents, to obviate all accumulation in the canal; while the preternatural opening should be so closed as to prevent the introduction of any matters into it. The use of laxatives, combined with clysters, and the employment of easily digested food, will accomplish the former object, and determine the feces towards the anus. Pressure on the fistula, by means of graduated compresses, supported by an elastic truss, fulfils the second indication. Confinement to bed should be insisted on; and there is every reason to expect that this plan, if steadily pursued, would prove effectual.

The occasional discharge of coloured mucus is not the only evil to which patients with fecal fistulæ are exposed. Prolapsus of the bowel through the aperture may occur from straining, injury, constipation, or other

* COOPER, part i, p. 17.

† COOPER, part i, p. 38. Another case may be seen in DE HAEN, *Ratio Medendi*, p. 7, cap. iv, § xix.

disorder of the canal; and, as the opening is small, the protruded bowel may easily become strangulated. Such a case occurred to FLAJANI. "Bernardino Facchino had undergone the operation for bubonocoele eighteen years since; a small fistula remained, through which a part of the feces passed: one morning, whilst making repeated efforts to expel his feces without the truss, which he constantly wore, he perceived the passage of a portion of the intestine through the fistula, and it increased in proportion to his efforts. Vomiting and fever ensued; and he entered the hospital the following morning. I found a portion of small intestine, eighteen inches in length, livid and flaccid, protruding from the fistula; the belly tumid; pulse irregular, extremities cold. I endeavoured to introduce a probe-pointed knife and dilate the aperture, but this was not possible. The symptoms continued, and in a few hours he died. On examination, a portion of the colon was found adherent to the opening, where it formed a sort of funnel. A piece of the ileum was fixed in the opening of the fistula. At the part which was inverted it adhered so firmly, that I could scarcely separate it with my hands*."

The case quoted from SCARPA, at p. 375, illustrates the same point.

* *Collezione d'osserv. et Riflessioni, &c.* tom. ii, quoted in the *Quarterly Journal of Foreign Medicine*, No x.

SECTION IX.

Discharge of Feces, without preceding Mortification of the Intestine.

CASES have occurred where no mortification of the bowel was discovered by the operation, but feces have come through the wound at some distance of time afterwards. The following instance happened at St. Bartholomew's hospital.

CASE.

A WOMAN, about sixty years of age, was brought to the hospital for a bubonocoele, which had been strangulated two days. The urgent nature of the symptoms induced Mr. RAMSDEN to operate in about two hours after her admission. The escape of a large quantity of turbid and fetid fluid, when an opening was made in the sac, led Mr. R. to fear that he had injured the intestine, but the subsequent complete exposure of the part proved this apprehension to have been groundless. The gut, which was much discoloured, was returned without difficulty, but seemed not to have completely re-entered the abdominal cavity. On passing the finger as high as the incision would admit, it did not fairly reach the abdomen, but conveyed an idea as if the intestine, although free from stricture, were con-

tained in a peculiar membranous bag. The patient was found in the evening, with great pain in the belly, an exceedingly quick and weak pulse, and cold sweats over the whole body. Clysters, which had been ordered for her, could not be forced up. After a long examination with candles, &c., some hardened feces were brought away from the rectum; but the low and faint state of the patient had now so greatly increased, that very little hope remained of her surviving even a few hours. On the next morning, to the great surprise of her attendants, she had considerably recovered; her pulse was about eighty, and moderately full; but as no stools had yet been procured, pills of the cathartic extract and calomel were given every two hours. She began to be purged in the evening, and had eight or ten stools before the next morning. Her strength again failed: the pulse could scarcely be felt, and the body was covered with a cold sweat. By the liberal use of strong broth, sago, and wine, she was so far restored in a few days as to sit up in bed. Her appetite returned, and well-grounded hopes of her recovery were entertained.

For some time after this she exhibited alternately the opposite symptoms above-mentioned, according to the state of the intestinal functions. She was seized, in about six weeks after the operation, with violent pain in the lower part of the abdomen, which terminated in two days in a discharge of the feces through the wound, and perfect ease. The appetite now failed, the strength decreased, and

death took place on the eighth day from the appearance of the feces in the wound.

On examining the body, the whole of the intestines were found so strongly adherent to each other, that they could not be separated without laceration. A portion of the ileum, the same probably which had been protruded, adhered to the abdominal ring. Its coats were greatly thickened, and its canal very much contracted. A small ulcerated aperture was discovered in this part; and led, in a fistulous form, through a substance nearly equal in size to the little finger, to the external wound.

PELLETAN operated on a crural hernia in a man on the seventh day. The intestine was returned, every thing went on well, and the wound was advancing to consolidation, when fecal matter appeared at the wound in small quantity. By the use of purgatives, clysters, and strict diet, this ceased, and the wound healed. Soon after, from over eating, a tumour took place near the cicatrix, inflamed and burst, and gave issue to feces and pus. By similar management he recovered again*.

* *Clin. Chirurg.* tom. iii, p. 65.

CHAPTER XIV.

ANATOMICAL DESCRIPTION OF THE FEMORAL RUPTURE.

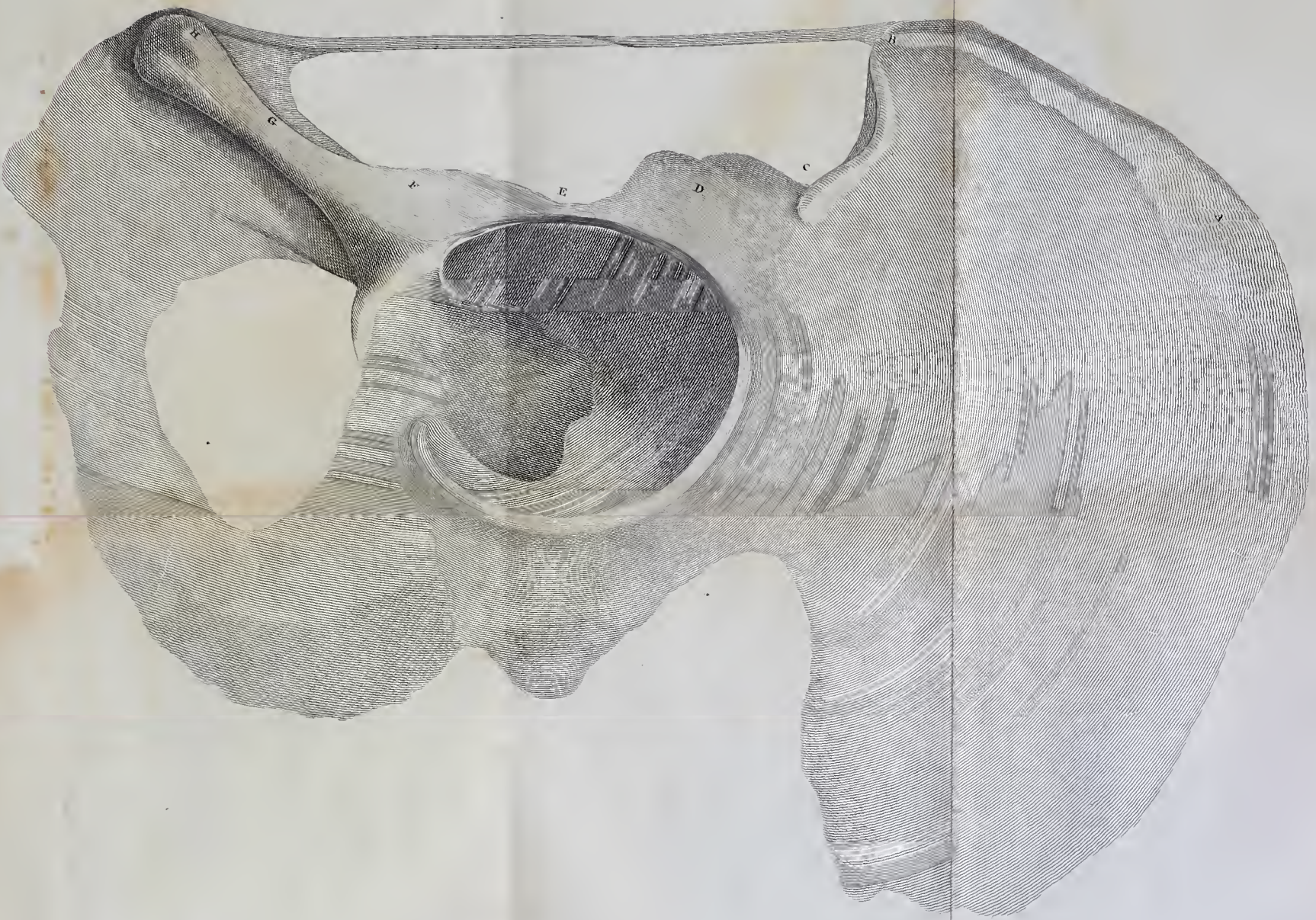
SECTION I.

Description of the Parts, in which the Femoral Rupture is situated.

THE circumference of the os innominatum presents, at the upper and anterior part of the bone, a large excavation, bounded on the outside by the anterior superior spinous process of the ileum, on the inside by the spine of the pubes, and filled by certain muscles and blood vessels, which pass from the abdomen to the thigh. Between the two bony points, constituting the boundaries of this hollow, the inferior edge of the aponeurosis of the obliquus externus abdominis is extended, under the name of the crural arch, or POUPART'S ligament. (See plate i.)

This concavity has an oblique position, slanting from behind, forwards, downwards, and inwards, so that one of its boundaries is external, superior, and posterior, the other internal, inferior, and anterior*.

* In the language of DR. BARCLAY, the former would be lateral, atlantal, and dorsal: the latter mesial, sacral, and sternal.





The distance between these is about four inches and a half. The thick and rough margin bounding the circumference of the ilium at its upper part, and called the *crista* (Pl. I. A.), terminates in front by a pointed protuberance (B), separated by a semi-lunar notch (C) from a similar tubercle which is under it (D): these processes are named the *anterior spines* of the ilium; and are distinguished by the epithets *superior* and *inferior*. On the inside of the latter, and over the acetabulum, there is a second notch (E), terminated by a smooth and gentle rising of the bone (F*), beyond which there is another excavation ending at the spine of the pubes (H†). Beyond the latter projection the edge of the bone is thick and level, extending inwards (mesially) for about half an inch, and terminated by the symphysis. The point, at which this level horizontal part is continuous with the perpendicular line of the symphysis, is the *angle* of the pubes.

To the superior spine are attached the fascia of the thigh, the tensor vaginæ, the sartorius, the crural

* The cartilage, which joins in the young subject the two separate portions of the os innominatum, called the ilium and pubes, is placed in the middle of this rising: consequently, that part of the general excavation, which is placed laterally with respect to this point, belongs to the ilium, that which is situated mesially, to the pubes.

† GIMBERNAT, WINSLOW, and BICHAT call it by this name; SOEEMMERRING gives it the appellation of *tuberculum spinosum*; *de corporis human. fab. tom. i, § 420*. It is the *tuberosity of the pubes* of Sir A. COOPER.

arch, and the iliacus internus; and to the inferior, one of the tendons of the rectus cruris. The notches c and e are filled by the iliacus internus and psoas magnus, and are continuous behind with the concave or pelvic surface of the ilium. The gentle excavation g is of particular importance. Its surface is smooth, broadest at the acetabulum, and growing narrower towards the spine of the bone; terminated in front by a prominent line, rising over the notch which contains the obturator vessels, and giving attachment to the pectineus, and behind, by a sharp and rough ridge, extended backwards and outwards from the spine, and called the crista of the pubes *. On this excavation the crural vessels are placed. The crista is continuous behind with the obtuse line†, which bounds the concavity of the ilium, and contributes with it to form the superior aperture of the pelvis. The space under the crural arch contains, besides the parts already enumerated, the anterior crural nerve, and some smaller nerves, which lie on the surface of the psoas and iliac muscles; the lymphatic trunks of the lower extremity and abdominal parietes, and one or more absorbing glands, surrounded by a loose cellular tissue.

* This, together with the following line, forms the *linea ileo-pectinea* of Sir A. COOPER. The surface of the bone at this part, as well as in the smooth hollow which receives the femoral vessels, is covered by a thick and closely adhering ligamentous substance, called by Sir A. COOPER *ligament of the pubes*.

† Sometimes called *linea innominata*: the tendon of the psoas parvus is inserted into it.

The surface of the bone between the spine and angle forms the basis of the triangle described by the inferior aperture of the abdominal canal; it is covered by the spermatic cord in the male, and by the round ligament of the uterus in the female subject.

The attachment of the aponeurosis of the external oblique muscle to the os innominatum has been described already, in the account of the inguinal hernia: it only remains for me to state more minutely some particulars concerning this part. It is fixed by a broad insertion into the pubes; this attachment, which begins at the spine, runs along the crista of the bone. Its position therefore (in the erect state of the body) is nearly though not entirely horizontal; consequently its two margins should be described by the epithets anterior and posterior: it being remembered at the same time, that the former of these is rather higher than the latter. That part of it which is fixed to the spine of the bone has the appearance of a firm and somewhat round tendinous cord; its insertion into the crista of the pubes is effected by means of a thinner portion, which gives to the tendon a clearly defined sharp edge at its posterior margin. The latter division of the tendon must of course be situated much more deeply from the surface than the former. Its sharp wiry edge can be felt very distinctly by passing the finger under the crural arch, on the inner (mesial) side of the femoral vein, either from above or below.

If we describe a distinct part under the name of

Poupart's ligament, we should state, that when it approaches to the bone, it becomes suddenly broader; that it is fixed by this broad portion along the whole length of the spine and crista of the pubes; that it has a rounded and strong anterior edge, a thin and sharp posterior margin, and that the former of these is nearer to the surface, while the latter is comparatively deep-seated. The breadth of this part varies in different subjects: it is generally from three quarters of an inch to an inch. Sometimes, as GIMBERNAT* has stated, it measures more than an inch. Dr. MONRO† has observed that it is broader in the male than in the female subject; and from this structure he explains partly the more rare occurrence of the femoral rupture in the male. As it is important for the surgeon to understand clearly the insertion of the crural arch in the pubes, I have had a drawing made to represent the ligament alone, with its two attachments, in order to show this point distinctly.

The anterior edge of Poupart's ligament represents a slightly curved line, with the convexity downwards, extended from the ilium to the pubes: the posterior border has an arched form‡ towards

* *Account of a new method of operating in Femoral Hernia*, p. 34.

† *Observations on Crural Hernia*, p. 51.

‡ This is sometimes called the crescentic or crescent-shaped edge of the crural arch: and the portion of tendon which forms it has been occasionally mentioned under the name of GIMBERNAT'S ligament. (Mr. HEY'S *Practical Observations*, 3d

the latter bone, in consequence of the expanded portion, which is fixed to its crista. Hence has arisen the appellation, used by GIMBERNAT, of the *crural arch*.

The parts, which have been already enumerated, fill up the space between the crural arch and the os innominatum. The crural vessels, placed in the smooth slope on the front of the pubes, are situated laterally with respect to each other. Next to the thin edge of the arch is the vein, with the artery lying externally to it. An absorbent gland is sometimes found between the vein and the tendon; or else this space is only occupied by loose cellular substance.

Since the tendon of the obliquus externus is stretched between two distant points, and there is a wide space under it, the student will suppose that protrusions of the abdominal viscera under its edge must happen very readily. This is effectually prevented by the attachments of certain fasciæ, confining the tendon closely to the surface of the parts, which it covers.

The iliacus internus, and that portion of the psoas magnus which lies by its side, are covered

ed. p. 146.) We are indebted to this Spanish surgeon for the first accurate description of the part in question; but as it is only a portion of the crural arch, not distinct from the rest, any name which might lead the student to regard it as a separate ligament is objectionable. GIMBERNAT published his remarks in 4to. at Madrid, in 1793, under the title of *Nuevo método de operar en la hernia crural, dedicado al rey nuestro señor Don Carlos IV.* The English version quoted above was executed by Dr. BEDDOES.

by a thin fascia* intimately connected with the expanded tendon of the psoas parvus, when that muscle exists. This fascia is in immediate contact with the muscles; the iliac vessels and the peritoneum cover its anterior surface, and are connected to it by a loose cellular substance. It is attached on the inside to the line which bounds the superior aperture of the pelvis; on the outside, to the anterior portion of the inner edge of the crista ilii; and below, to the posterior margin of the crural arch†. The latter insertion terminates in a pointed form just over the passage of the vein. Another part of the fascia is continued over the bone, and behind the artery and vein, into the thigh, where it forms the posterior portion of the sheath, including those vessels, and is continuous with the fascia lata. In the interior of the sheath it produces a septum, dividing the vein and artery.

In consequence of the structure just described, the crural arch is firmly confined in its situation, and the protrusion of the abdominal viscera under it is obviated‡. A small space, however, is left between

* It is described by Sir A. COOPER, under the name of *fascia iliaca*.

Mr. J. CLOQUET calls it *aponevrose pelvienne*, and describes it as descending into the pelvis, lining the cavity, perforated by the vessels and nerves which pass out, and adhering to the sides of the viscera at the inferior aperture. *Recherches Anat.* p. 62.

† Here the fascia consists of two layers, with the arteria and vena circumflexa ilii passing between them.

‡ In the second edition of his work on hernia, SCARPA has described and delineated a further provision, calculated to secure these objects. After observing that the sheath of the femoral

the iliac vein and the thin border of the tendon, not closed towards the abdominal cavity, and consequently affording an opportunity for the occurrence of herniæ. This, which is either filled with cellular substance or an absorbent gland, is called by GIMBERNAT* the *crural*, and by Mr. HEY† the *femoral* ring. The space in question is bounded above and in front by the crural arch; below and behind by the pubes; on the internal or mesial side by the thin border of the tendon; and on the outer or lateral aspect by the crural vein‡.

At the upper and anterior part of the limb, the fascia lata, or fascia of the thigh, consists of two portions, an external and an internal, with distinct insertions. The former, which is the thickest and strongest, covers the sartorius and rectus femoris, and is inserted into Poupart's ligament, from the vessels is formed, within the pelvis, by the iliac fascia, and without by the fascia lata, both connected to the crural arch, he adds, that "this connection between the internal and external aponeurosis is strengthened by a mode of union not hitherto indicated by anatomists; that is, by an attachment of the femoral sheath, formed by these aponeuroses, to the iliopectineal eminence of the os innominatum. This attachment divides into two parts the space left under the crural arch, braces the arch strongly down at its middle, and prevents any displacement of the vessels, in the various motions of the lower limb." *Supplément au Traité Pratique*, p. 38, pl. 13.

* P. 38.

† P. 148, 1st edit. In the 3d edit. this appellation is not retained in the text; see p. 147: though it is used in the explanation of pl. 7.

‡ See the measurements quoted from Sir A. COOPER, chap. ix, sect. i.

anterior superior spine of the ilium to the inner edge of the femoral vein. The latter, thinner and weaker, covers the pectineus and adductor muscles, and is inserted into the pubes * in front of the origin of the former. It passes behind the femoral vessels, and is there continuous with the iliac fascia, while the external portion covers these vessels anteriorly, just below the crural arch, and the vessels themselves are consequently situated between these two divisions of the fascia.

Under the anterior portion of the crural arch a large oval depression is found at the front of the thigh, on the surface of the pectineus muscle †. At the upper, outer, and lower sides, this hollow is bounded by a sharp and defined edge of the fascia; but it has no such boundary internally. Where the

* SCARPA represents that this portion is inserted, not into the bone, but into GIMBERNAT'S ligament, in front of the pubes. "Arrivée pres de l'insertion du ligament de Fallope au pubis, elle passe au-dessous de la lame externe et s'insère tout le long de l'axe longitudinal du ligament de GIMBERNAT, qui se trouve ainsi divisé en deux parties, l'une supérieure ou antérieure, l'autre inférieure et postérieure ou interne." *Supplément au Traité Prat.* p. 35, pl. 13.

† BICHAT, in describing the fascia of the thigh, says, "Elle est percée de divers trous pour le passage des vaisseaux et nerfs. Le plus remarquable de ces trous est celui qui, placé sous le ligament de Fallope, au devant du pectiné, donne passage à la veine saphène." *Anat. Descr.* tom. ii, p. 309. It is strange that so remarkable a feature in the anatomy of the fascia should have been entirely overlooked by SOEEMMERRING, both in his account of the fascia, and of the vein. *De Corp. Hum. fab.* tom. iii. § 281 : and tom. v, § 263.

attachment of the fascia lata to the crural arch terminates, it forms a distinct semi-lunar or crescent-shaped fold *. The upper end, or horn of this crescent, passes in front of the femoral vessels, just as they emerge from behind the crural arch, and bends a little under POUPART's ligament, so as to unite with the thin portion or border of the arch, called

* This part is represented in the first plate of SIR A. COOPER's work on inguinal hernia, although it is not marked by any letter of reference. Its upper extremity is particularly seen in the 4th, 5th, and 6th plates of MR. HEY's work, edit. 3d. But MR. A. BURNS of Glasgow has described it the most minutely, under the name of the *falciform process* of the fascia lata, in "Observations on the Structure of the Parts concerned in Crural Hernia," contained in the 2d vol. of the *Edinburgh Medical and Surgical Journal*, p. 265—274, with two plates. In describing that portion of the fascia lata, which is fixed to the crural arch, MR. BURNS gives the following account of the falciform process. "Just where this layer ceases to arise from the arch, we find the superficial vein entering, and therefore this vein is not covered with the inner or principal layer of the fascia, and, on dissecting away the vein, we see still better the structure of these parts: we find that the fascia stops just at the entrance of this vein, and, in many cases, it terminates abruptly with a neat, firm margin, which is traced some way down the thigh. The edge is lunated, and the concavity is directed towards the pubes, or superficial vein. This is the usual appearance of the parts; sometimes, however, the structure is not quite so distinct, for occasionally a considerable quantity of reticular cellular matter is placed about, and adheres to the crescentic margin of the fascia. Nevertheless, in every instance, this lunated edge may be discovered, by passing the finger from the abdomen through the crural ring, and pressing outward; and by dissection it may be clearly demonstrated in emaciated anasaruous subjects."

GIMBERNAT'S ligament, at its commencement*. The concavity is turned towards the pubes, or the opposite limb. The fold passes straight downwards on the thigh, for an inch and a half or two inches, and then turns inwards and upwards, to form the inferior boundary of the oval space, which presents a strongly marked semi-lunar edge, with the concavity turned upwards†. Here the two divisions of

* SCARPA, *Supplément*; pl. 12. This connection is well represented in the figures of Mr. HEY's work already referred to; in the first edition of which, at p. 151 and 107, he describes the part formed by this junction under the name of *femoral ligament*, an expression which is not retained in the subsequent editions.

The leading points in the anatomy of femoral hernia; *viz.* the protrusion of the viscera on the inner (mesial) side of the iliac vein; their strangulation by a part of the crural arch, which is felt when the finger is thrust down towards the thigh in this direction; and the important practical fact, that the division of this part is the best way of relieving the stricture, were ascertained by Mr. HEY from his own experience, and are correctly stated in his excellent *Practical Observations*, which constitute a most valuable addition to the records of surgery.

† This must be the part described by Mr. BURNS in the following passage: "About an inch and a half below the crest of the pubes, the pectineal aponeurosis sends off a process or duplicature, to be inserted into the under surface of the fascia, at a very little distance from the falciform process; and this duplicature divides the superficial vein and lymphatics, which enter with it, completely from the large vessels lying beneath the fascia; and over the edge of this process we in general find an oblong conglobate gland folded, one half stretching beneath the aponeurosis; the other descends above it, and thus between the two portions this duplicature is interposed. On the outer side of the duplicature we discover the vena saphena lying in a hollow, or

the fascia lata are continuous. On the inner side the oval depression is not defined by any boundary. The fascia covering the pectineus is continued behind the femoral vessels, and the handle of a scalpel may be passed along its surface in this direction, so as to elevate them. This oval depression is occupied by the deep-seated inguinal glands, the femoral vessels, and cellular substance.

The femoral artery and vein, surrounded and connected by a compact fibrous substance, are covered in front, immediately below the crural arch, by the falciform process of the fascia lata; and they lie on the production continued over the pubes from the iliac fascia. The former therefore constitutes the anterior, and the latter the posterior layer of the sheath including these vessels. On the outer side of the vessels the latter is united to the sheath including the sartorius.

A small portion of the vein, on its inner side, is not covered by the falciform process; the sheath is here completed by a dense fibrous substance. The great saphena vein passes over the inferior sharp edge of the falciform process, and joins the femoral at this part.

Between the parts just described and the integuments, a thin layer intervenes, of aponeurotic cha-

channel, which is covered only by the superficial thin layer of fascia, and which leads us up to the crural foramen of GIMBERNAT, situated between the great vein and the crescentic fold at the pubes; and in femoral hernia it is in this hollow, which may be called the vagina of the saphenic vein, that the gut is lodged.

racter, or at least of closely condensed cellular structure*; it was described by CAMPER†, and is called by Sir A. COOPER, who noticed it more fully, the *superficial fascia*. It covers the obliquus externus, the groin, and the upper part of the thigh, being quite distinct from the fascia lata, and separated from it by loose cellular tissue, by the deep-seated inguinal glands, and by the great saphena vein. It consists, at the bend of the thigh, of two layers, between which the superficial inguinal glands and adipous matter, apparently contained in separate cells, are placed. The internal layer is connected to the crural arch, to the opening in the tendon of the obliquus externus, and to the suspensory ligament of the penis. The fascia itself is lost below in the subcutaneous adipous substance of the thigh; it descends over the spermatic cord, joining the external covering, or tunica vaginalis communis of that part.

* According to Dr. BRESCHET, this expansion (feuillet membraniforme), which in man has a cellular structure (tissu lamineux), is remarkably thick and firm in some animals, being called by Zootomists the *abdominal tunic*. It is a yellowish, firm, and very elastic membrane, similar in these characters to the cervical ligament of the great quadrupeds. It extends from the abdominal prolongation of the sternum to the pubes, covering nearly the whole obliquus externus, and forming a support to the viscera. It exhibits longitudinal fibres, forming folds in the same direction; these folds are strongly marked behind, and the fibres constituting them are united to each other and to the subjacent aponeurosis by a loose cellular tissue, which allows to the tunic a great power of extension. *Concours, &c.* p. 124.

† *Icones Hern.* p. 11.

The crural arch, and the adjacent tendinous expansions, are a complex subject, which cannot be understood from description alone*. The different parts of this structure must be designated by particular names; and these are supposed to belong to distinct and separate organs. Let the student constantly bear in mind that these are all intimately connected, and that the different names indicate parts of one continuous expansion. The iliac fascia should be regarded as a part of the fascia lata:

* These parts should be dissected both from before and behind. In the former case, after removing the integuments, the superficial fascia, with the absorbent glands, and some cutaneous veins, is brought into view. When these are dissected away, we see the attachment of the fascia lata to the crural arch; the termination of this portion in the lunated edge, over the femoral vein; its continuity behind the saphena, by a second semi-lunar edge, with the pectineal portion of the fascia; the insertion of the latter into the pubes, or, according to SCARPA, into GIMBERNAT's ligament; and the oval depression in which the saphena is placed at its termination. By detaching the lunated edge of the fascia from the crural arch, the femoral artery and vein will be exposed, and if these are cut across and turned upwards, the continuation of the fascia lata from the pectineus muscle, behind them, and over the pubes, to constitute the fascia iliaca, is brought into view. When the peritoneum is separated from these parts on the inside, the iliac portion of the femoral fascia (fascia iliaca) is exposed, with the iliac vessels lying on it: its connection with the crural arch; the broad insertion of the arch into the spine and crista of the pubes; its crescentic edge, and the space between this margin and the iliac vein, called the femoral ring, are also exposed. By dividing either the thin border of the arch, or the semi-lunar edge of the fascia near the arch, the mutual tension of these parts is destroyed.

the thin border of the crural arch and the semilunar portion of the fascia lata are so intimately connected, that no just idea can be formed of them in an insulated state. This general connection maintains all the parts in a condition of mutual tension, which is materially affected by the position of the thigh, in consequence of the attachment of the femoral aponeurosis to the crural arch. The latter is drawn downwards by this insertion, so as to describe a convex line towards the thigh. When the limb is extended, rotated outwards, and carried in the direction of abduction, the parts are in the greatest tension. The semi-lunar edge of the fascia, and the posterior border of the crural arch, which, at the point of their junction, form the upper boundary of the crural ring, are then found to press very closely on the finger passed into that ring; and the crural arch itself is drawn downwards as much as possible. By rotating the thigh inwards, bending it, and carrying it across the opposite limb, the parts are brought into the most complete relaxation, and the pressure on the finger is sensibly diminished.

SECTION II.

Anatomical Description of the Femoral Rupture.

THIS rupture takes place through that space named the crural ring, which is situated under the crural

arch, and between its thin border and the external iliac vein *. Protrusion of the viscera under any other part of the tendon is prevented by the attachment of the iliac fascia. The situation of the descent has been rightly stated by POTT†; but it is erroneously represented in several works, which are usually considered as of the highest authority. PETIT‡ and SABATIER§ speak of the parts descending in some cases over the *psoas magnus* and *iliacus internus*. CALLISEN|| states, that the iliac vessels may be found behind, or on either side of the tumour: and even RICHTER¶, who says that the parts commonly protrude in the situation above described, mentions that they sometimes come down before, and sometimes on

* As the protrusion does not take place through a simple aperture, but follows a course of some length, the expression of *crural canal*, employed by SCARPA, BRESCHET, and CLOQUET, is more correct than that of the *crural ring*. The superior or posterior aperture of the canal is the opening already described under the name of *crural ring* (p. 391); the canal extends obliquely downwards and forwards for a space of half or three quarters of an inch; and its lower or anterior end is at the oval depression, for the entrance of the *vena saphena*.

† *Works*, vol. ii, p. 152.

‡ *Traité des Mal. Chirurg.* tom. ii, p. 249.

§ *Médecine Opératoire*, tom. i, p. 143.

|| *Systema Chirurg. hodiern. pars post.* p. 495.

¶ *Traité des Hernies*, p. 242. RICHERAND, whose system, although very recent, contains none of the late additions to our knowledge on this subject, has the same erroneous statement. *Nosographie Chirurg.* tom. iii, p. 400.

the outside of the iliac vessels. All those who have taken the trouble to investigate carefully the structure of the parts in the natural and ruptured condition, represent the fact as I have stated it above: GIMBERNAT, HEY, MONRO, COOPER, SCARPA*, and other modern writers †, are unanimous on this point. No instance of hernia under the crural arch has been hitherto recorded, except at the crural ring ‡. It is true, indeed, that the swelling of a crural rupture extends laterally in the bend of the thigh, and therefore may be said, in many cases, to lie in front of the iliac vessels; but the mouth of the sac, or the part at which the viscera are protruded,

* Mem. iii, § ii.

† LE DRAN, *Obs. de Chir.* tom. ii, p. 2; MORGAGNI, *Epist.* xxxiv, art. xv; ARNAUD, *Mem. de Chir.* tom. ii, p. 768; BERTRANDI, *Trattato delle Operazioni*, tom. i, annot. p. 218; DESAULT, *Tr. des Mal. Chir.* p. 191 — 195; NESSI, *Instit. Chirurg.* tom. ii, p. 198; LASSUS, *Méd. Opérat.* tom. i, p. 198.

‡ Some writers have spoken of crural herniæ above the crural arch. In the 3d section of chap. ix, I have noticed a case of this kind, which appears to have been an inguinal hernia, that had not passed the lower opening of that canal. Dr. HULL has rightly referred such cases to the inguinal or ventral species. *Med. and Phys. Journal*, vol. xi, p. 49.

“ L’artère épigastrique peut se trouver en-dedans du sac de la hernie crurale; celle-ci descend alors au-devant des vaisseaux fémoraux. Je ne possède qu’une seule observation de ce cas. Suffit-elle pour proposer de distinguer les hernies crurales en externes et en internes, comme on l’a fait pour les hernies inguinales? Je le pense.” J. CLOQUET, *Rech. Anatom. sur les Hernies*, &c. p. 85.

on the inner side of the vein, even in the largest crural herniæ*.

The viscera descend from the abdomen at first nearly in a perpendicular direction, and come into the hollow in front of the pectineus. Since the motions of the thigh, and the more close adhesion of the integuments to the subjacent parts resist the increase of the tumour downwards, and the larger quantity of cellular and adipous substance at the end of the limb offers less resistance, it comes forward to the surface, so as to lie in general in front of the crural arch. For the same reason it extends outwards, or towards the ilium, assuming an oblong shape, with the long axis parallel to the crural arch. In consequence of this structure, the *body* of the sac forms a right angle with the *neck*; and that part of it, which, if it had continued to descend in a straight direction, would have been the lowest part of the bag, or the *fundus*, is actually the anterior portion.

That portion of the sac, which, lying under Poutart's ligament, may be called its neck, is generally about half an inch in length, and is frequently more: its dimensions indeed correspond exactly to those of the crural canal. When we consider that the strangulation takes place exactly where this contracted portion communicates with the abdominal cavity,

* See the case of immense crural hernia related in the next chapter.

SCARPA found the neck of the sac in the same situation in a similar instance of enormous crural rupture. *Supplément*, p. 41.

and that the parts are covered by a considerable thickness of adipous substance, we shall expect to find the strangulated part at a great distance from the surface.

The viscera descend over the pubes, where the pectineal portion of the fascia lata, after closely covering the muscle, is inserted into the bone; hence the tumour is situated in front of the pectineus, and of the fascia lata. I think it right to be more explicit on this point, as surgeons have generally supposed that the femoral rupture is covered by the fascia of the thigh*; and they even go so far as to say, that, in performing the operation, we may cut boldly through the integuments on this very account. I suspected the truth of this representation, from having often looked in vain for the fascia in operations; and from observing that the tumour feels loose, and has a circumscribed edge, instead of being tense, and having that obscurely defined margin which we should expect, if it were covered with the fascia. Dissection has shown that my suspicion was well grounded. If the integuments and cellular substance are carefully removed from a femoral rupture, we shall find that it lies on that portion of

* This opinion will be found in most surgical books: that it is retained, even in very modern works, will be proved by the two following quotations. MONRO states, that a crural is less moveable than a scrotal hernia, in consequence of its being immediately covered and bound down by the tendinous aponeurosis of the muscles of the thigh. *On Crural Hernia*, p. 56.

“ We know also that the herniary tumour is in truth under the fascia.” *System of Operative Surgery*, vol. i, p. 294.

the fascia, which, covering the pectineus, is inserted into the front edge of the pubes ; and that, as it comes over the margin of the bone, to which the fascia is fixed, it must necessarily be placed on the anterior surface of that part.

The variety of crural hernia*, in which the parts are contained within the sheath of the crural vessels, must be excepted from these observations. The swelling in that case is covered by the fascia lata ; is consequently more obscure to the feel ; and has not a defined edge.

The peritoneal sac of the rupture is covered by an exterior investment, named by Sir A. COOPER the *fascia propria*. This is generally thicker than the peritoneum, close and firm in its texture, and embraces the whole of the tumour, to the very neck. More or less adipous substance is interposed between it and the peritoneal covering of the rupture. Since the parts descend on the inner side of the vein, I am disposed to refer the origin of this fascia propria to the condensed fibrous substance, which completes the crural sheath on its inner or mesial side. The superficial covering is often consolidated at some parts with the fascia propria ; and that again with the peritoneal sac.

Sir A. COOPER gives the following account of the fascia propria and its origin. “ A thin fascia† naturally covers the opening, through which the hernia passes, and descends on the posterior part

* COOPER, part ii, p. 20, plate viii, fig. i.

† I have not found this on dissection.

of the pubes. When the hernia therefore enters the sheath, it pushes this fascia before it, so that the sac may be perfectly drawn from its inner side, and the fascia which covers it left distinct. The fascia, which forms the crural sheath, and in which are placed the hole or holes for the absorbent vessels, is also protruded forwards, and is united with the other, so that the two become thus consolidated into one. If a large hernia is examined, the fascia is only found to proceed upwards, as far as the edge of the orifice on the inner side of the crural sheath, by which the hernia descends; but in a small hernia it passes into the abdomen as far as the peritoneum, and forms a pouch, from which the hernial sac may be withdrawn, leaving this, forming a complete bag over the hernia*."

The upper end of the falciform process passes over the upper and outer part of the neck of the tumour; it is then folded under the crural arch, and continues into the thin posterior border. The iliac vein is placed on its outer side; the pubes is directly behind it; and the upper and inner parts are bounded by the thin posterior edge of Poupart's ligament. It

* Pt. ii, p. 6 and 7. Some casual notices may be found of the structure of the sac in crural hernia. MORGAGNI observed, in dissecting such a case, "that the hernial sacculus was thick, and easily divisible into many laminæ of coats." Lett. xxxiv, art. xv; MAUCHART also noticed the fact, "Saccus herniosus etiam in hernia crurali duplex est," &c. See HALLER, *Disp. Chir.* tom. iii, p. 152. But it was not generally understood until the publication of Sir A. COOPER's work.

is this part which forms the strangulation, as any person may easily ascertain, by passing his finger into the neck of the sac, or by thrusting it, in the healthy subject, into the corresponding part. The merit of first discovering and of making public this fact is due to GIMBERNAT.

The semi-lunar portion of the fascia being attached to the crural arch at the point, at which the hernia comes out, contributes in some degree to the strangulation, as we may ascertain by passing the finger in the course of the rupture. Indeed the upper boundary of the crural ring is formed by the continuity of the falciform process with the thin border of the crural arch: and, as this is the seat of the stricture, both these parts are concerned in forming it. Hence the stricture is relieved by relaxing this process. It is not, however, so essentially concerned in producing the incarceration as the thin posterior border of Poupart's ligament.

In the second part of his observations on hernia, Sir A. COOPER has entered very minutely into the description of the anatomy of the crural arch, both in the natural and ruptured state. According to his representation, the viscera contained in a crural rupture are protruded in the first instance into the sheath surrounding the femoral vessels: from which they escape through the openings, formed for the passage of the lymphatics of the lower extremity. Hence it follows, that the most frequent seat of strangulation is in the margin of this opening.

My own examinations of the subject have led me to refer the cause of stricture to the thin posterior border of the crural arch, at the part where it is connected to the falciform process, and I have hitherto found no reason to change my opinion on that subject. The difference does not appear an important one; nor can it influence the mode of operating*.

The epigastric artery passes obliquely upwards and inwards on the outside of the hernial sac; and is situated at the distance of half an inch from the neck of that part†. The obturatrix artery is frequently produced by the epigastric, in which case it

* SCARPA expressly states his dissent from the opinion of Sir A. COOPER on this subject, and his opinion, that the sac passes out between the concave edge of GIMBERNAT's ligament and the side of the femoral vein; *Supplément*, p. 42.

The following quotation exhibits the opinion of Mr. CLOQUET on the same subject.

“ Dans les hernies crurales, le sac peut descendre tout le long du canal du même nom, et sortir par son ouverture inférieure (trou pour la veine saphène). Le plus souvent il passe par une ouverture arrondie que présente ce canal, tout près du ligament de GIMBERNAT. Quelquefois il sort par les trous de sa paroi antérieure. Enfin je l'ai vu s'engager par une ouverture de la paroi postérieure. Il reposait immédiatement sur le muscle pectiné, et avait au-devant de lui l'artère et la veine fémorales, dont il était séparé par le feuillet profond de l'aponevrose fascia lata. J. CLOQUET, *Recherches Anat.* p. 85.

† “ L'artère épigastrique,” says SCARPA, “néé de l'iliaque externe, près l'arcade crural, à neuf lignes de l'anneau crural, se dirige obliquement de dehors en dedans et remonte vers la ligne blanche, distante de quatre lignes du col du sac herniaire et du côté externe de l'anneau crural.” *Supplément*, p. 52.

may either go on the outer* side of the sac to the obturator foramen, or it may pursue its course along the inner margin. In the latter distribution the neck of the sac would be surrounded by a large vessel in three-fourths of its circumference. The iliac vein is on the outside; the common trunk of the epigastric and the obturator vessels would lie on the front, and the obturatrix artery itself would be found on the inner margin of the sac.

The spermatic cord and the round ligament of

* This, which is the usual course, is delineated by Dr. MONRO, in his *Morbid Anat. of the Gullet*, &c. pl. xv, fig. i.

The Doctor adds, "when the trunk common to the obturator and epigastric arteries is of an inch or an inch and a half in length, the obturator artery is then situated between the symphysis pubis and the hernial sac, and sometimes follows the same course as that part of the crural arch called GIMBERNAT'S ligament, of which I have seen several examples." Ibid, p. 428. He does not, I presume, mean to assert that he has seen several examples of the obturatrix artery situated on the inner side of the neck of the sac, for he has not delineated this arrangement; and its occurrence is so rare that Sir A. COOPER has not met with it. In a subsequent passage Dr. MONRO states that he has seen three cases (p. 485). An instance, in which Mr. A. BURNS observed it, is mentioned in the work of Dr. MONRO, *ibid.* p. 483; Dr. BRESCHET mentions an example, which was observed by Mr. DUCROS of Marseilles; *Concours*, &c.; obs. xxviii, p. 153. Another case is quoted by SCARPA (*Supplément*, p. 83) from LEBERECHE, *Diss. de extensionis in solvendis herniis cruralibus incarceratis, præ incisione præstantia*; Berlin, 1816. The following quotation shows that CLOQUET had observed it. "Quand l'artère obturatrice naît de l'épigastrique, elle peut se trouver en dehors (c'est le cas le plus fréquent), en dessus et en dedans, ou bien en dessous du sac. Je conserve des piéces d'anatomie

the uterus pass directly over the superior part of the swelling; and are not more than half an inch distant from the mouth of the sac *.

pathologique où l'on observe ces variétés dans la position de l'artère obturatrice." *Recherches Anat.* p. 86.

* A case dissected and figured by Mr. J. CLOQUET affords the only instance I know of an exception to this arrangement. An external inguinal and a crural rupture were found on the same side. The spermatic cord, passing along the inner side of the neck of the crural sac, joined the crural arch at a right angle. Probably the inguinal rupture had formed first, and, by displacing the epigastric artery and cord towards the pubes, had facilitated the occurrence of this peculiarity. *Recherches Pathol.* p. 82, note, pl. vii, fig. iv and v.

CHAPTER XV.

SYMPTOMS AND DIAGNOSIS OF THE FEMORAL RUPTURE.

FEMORAL ruptures are by much the most frequent in women; they may indeed be regarded as the peculiar herniæ of the female, as the inguinal are of the male sex*. Mr. HEY† never met with any kind of strangulated hernia in females but this. The greater breadth of the female pelvis, and the

* MORGAGNI had never seen crural hernia in the male. “Mihi, ut verum fatear, nondum nisi in feminis accidit, ut eam viderem.” *Epist.* 34, art. 15. HEVIN had only once operated on it in the male. *Pathol. et Therap.* p. 406. SANDIFORT and WALTER had seen it only once in the dead subject in the male. *Obs. Anat. Pathol.* c. iv, p. 72; *Sylloge Comment. Anat.* p. 24, obs. 21. ARNAUD had never been able to dissect it in the male; *Mem. de Chir.* tom. ii, p. 782. It is however by no means so uncommon in men as these quotations would lead us to expect. I have seen many instances of it; and Dr. BRESCHET states that he had observed more than thirty cases, within a few years, in attending the practice of Mr. DUPUYTREN. See his very scientific and interesting *Considerations et Observations Anatomiques et Physiologiques sur la Hernie Femorale*, in his *CONCOURS*, p. 42.

† *Practical Obs.* p. 154. It is also much more frequent in married women than in girls: ARNAUD states, that nineteen out of twenty married women, afflicted with hernia, have this species of the complaint; while in men and unmarried females, not one in a hundred has it: p. 133.

broader insertion of the crural arch in the male, are the assigned causes of this difference. It may be combined with an inguinal hernia on the same side; but this is not common.

It is attended with an indolent swelling at the inner part of the bend of the thigh, and with the general symptoms, which denote a protrusion of the abdominal viscera. The space through which it descends is very small, and does not admit of much enlargement in any direction. Hence the swelling is generally small, and sometimes remarkably so*. The opening is very seldom increased to any great magnitude, as that of the abdominal ring is in large and old scrotal herniæ. Exceptions to this observation, although rare, occasionally happen.

CASE.

A middle-aged woman was admitted into St. Bartholomew's hospital with a femoral rupture of eight years' standing. It had generally admitted of partial reduction, and once, during a state of pregnancy, had entirely receded. Although the size of the swelling had been always very considerable, it had never occasioned any inconvenience, except from its bulk, until the time of her admission, when it measured nineteen inches across in the perpendicular direction, and twenty-seven inches in circumference.

* Dr. HULL states that the tumour varies ordinarily from the bulk of a hazel nut to that of a walnut. *Med. and Phys. Jour.* vol. xi, p. 54. SABATIER particularly notices the smallness of the swelling; *Med. Op.* tom. i, p. 144 et seq.

The integuments at this time had a red appearance, and the patient was in a state of considerable general weakness; the strength gradually declined; the integuments ulcerated and burst, so as to expose the intestines partially; and about a gallon of serous fluid escaped from the opening. There was a constant discharge of the same fluid until the time of her death. Dissection showed that the protrusion had taken place in the usual situation under the crural arch, and that the sac contained the whole of the jejunum, ileum, cæcum, and ascending colon, with a large share of the omentum.

Mr. HEY* mentions a similar instance to that which I have now related; and Dr. THOMSON†, the learned professor of military surgery in Edinburgh, has witnessed a case of the same description. In both of the last-mentioned patients the integuments had become so thin, in consequence of the increase of the tumour, that the peristaltic motion of the bowels could be distinguished.

Intestine is the part most frequently contained in crural herniæ: omentum alone is seldom seen in them. When the swelling is small it may easily be mistaken for an inguinal gland, particularly if it contain omentum‡. The circumstances, which at-

* *Practical Observations*, p. 230.

† COOPER, pt. ii, p. 6. Dr. HULL in one instance saw a femoral hernia as large as a child's head, in a man.

‡ SABATIER acknowledges that he has mistaken femoral hernia for an enlarged gland; and vice-versa. *Med. Operat.* tom. i, p. 144 and 147.

tended the origin and progress of the tumour, together with its present state and symptoms, generally enable the surgeon to decide upon the nature of the complaint; although the sensible characters of the swelling should be insufficient to lead to this discrimination. If it appeared suddenly, after a violent effort; if it increase in consequence of exertion, and diminish or disappear on pressure, or in the recumbent posture; if an impulse be felt when the patient coughs; and intestinal affections have been caused by it, the case must be a hernia. An enlarged gland is generally harder than an unincarcerated hernia; it swells imperceptibly and gradually; is invariable in its size; and causes no disturbance of the alimentary canal. The existence of symptoms, which usually attend a strangulated hernia, will remove any doubt that the surgeon might entertain on the subject; and, if these symptoms do not yield to the usual remedies, will authorize him in operating, although the examination of the tumour should not satisfy his mind that the swelling is a hernia. No great inconvenience can arise from cutting down upon an enlarged gland; while the patient's life would be endangered by putting off the operation in a case of rupture. These considerations would undoubtedly have justified Mr. ELSE in opening the tumour in the fatal case of crural hernia which he has recorded in the fourth volume of the *Medical Observations and Inquiries*; for the want of fecal evacuations clearly pointed out the nature of the affection.

I have seen an hospital surgeon, a man of considerable practice and eminence in his profession, mistake a femoral hernia for a glandular enlargement, although the attendant symptoms sufficiently indicated the nature of the complaint. So strongly did the tumour in all its sensible characters resemble a swoln gland, that the operation was not performed, although the marks of strangulation were present; and the patient's death afforded an opportunity of ascertaining, that the complaint had been caused by a protrusion of the bowel. Sir A. COOPER informs us, that a surgeon in considerable practice sent into Guy's hospital a man with a crural hernia, which had been poulticed for three days on the supposition of its being a venereal bubo; and when the operation was performed, the intestine was found mortified. In another case the swelling was opened, under a similar mistake; the stools were discharged at the opening, and the patient soon after died*. Similar fatal errors are recorded by PETIT†. The importance of this subject, and the inevitably fatal consequences of a mistake, induce me to repeat, what I have already observed, that the existence of symptoms justifies us in operating where the characters of the tumour are doubtful. I will venture to add, that, if in compliance with this maxim, the surgeon should, under any unusual concurrence of circumstances, cut down on a merely glandular

* Pt. ii, p. 8.

† *Tr. des Mal. Chir.* tom. ii, p. 293, et seq.

swelling, he will be acquitted in the opinion of every judicious practitioner; and his conduct will not be attended with any injurious consequence to the patient: if, on the contrary, he persists in preferring the testimony of his touch to the dictates of his reason and judgment, and refuses to operate, where the symptoms demand the use of the knife, he must be considered responsible for the death of the patient.

A femoral rupture has often been mistaken for a bubonocoele; and the error is not an improbable one, in consequence of the swelling lying, as it frequently does, on the crural arch. The surgeon may consider this mistake an innocent one, since the nature of the complaint and the general measures required for its relief are the same in both cases. He must change his opinion when he finds that the pressure in the attempts at reduction ought to be exerted in a very different direction; and that the close connection of various important parts with the crural hernia would expose him to the risk of some dangerous or even fatal mistake in performing the operation, under such an erroneous idea as to the situation of the rupture. The relation which the neck of the tumour bears to the crural arch, and to the spine of the pubes, will enable the practitioner to distinguish the two cases. If the swelling of a crural hernia be drawn downwards, it will be found that the crural arch can be traced passing over the neck of the sac: while in bubonocoele it is

found under that part. The spine of the pubes, which is behind and below the neck of the sack in an inguinal hernia, is on the same horizontal level, and rather within it, in the crural species*.

The swelling formed under the crural arch in the case of psoas abscess may be mistaken for a crural rupture. It is an indolent tumour, which may be made to disappear, at least partially, on pressure, and in which coughing or holding the breath gives the

* RICHTER has seen this mistake often committed, even by persons of experience; *Tr. des Hernies*, p. 243; and Sir A. COOPER has witnessed similar blunders.

“J’ai opéré de ces hernies, dont j’étois persuadé qu’elles avoient leur issue par l’anneau, et n’ai reconnu mon erreur qu’après avoir ouvert le sac,” &c. PELLETAN, *Clin. Chirurg.* iii, 27.

The facility with which this mistake may be committed is probably the reason why the existence of crural hernia, as a distinct species, was so long overlooked. VERHEYEN, who published his *Anatomia Corporis Humani* in 1693, is generally considered to have been the first who noticed it. I subjoin the passage, as it contains an instance, in which the rupture caused no external swelling. “Alius huic vicinus locus est, ubi fiunt herniæ periculosæ et sæpe lethales; scilicet ubi venæ et arteriæ iliacæ tendunt ad crura.” After mentioning a fatal case, he adds, “Eundem casum invenio quoque observatum a Cl. D. NUCK; et, quod mireris, in utroque casu nihil exterius fuit observatum, quod referret herniæ speciem, neque ægri de aliqua in eo loco molestia fuerant conquesti, adeo exigua apparet causa istius mali.” *Tract.* ii, cap. vii. LE QUIN, however, seems to have known the femoral hernia before this time. See his *Tractatus de herniis* in the *Chirurgia Barbettiana*, in the works of BARBETTE, by MANGET, pp. 54, 55, and 74.

feeling of an impulse. The contents of the swelling are fluid; hence fluctuation may generally be perceived, and the swelling does not retire, as a rupture does, in the recumbent posture. As this kind of local affection is subsequent to the formation of an abscess in the neighbourhood of the psoas muscle, the preceding pain in the loins, attended, perhaps, with shivering and other symptoms, and the absence of the intestinal affections attendant on herniæ, enable us to distinguish the nature of the complaint. If the surgeon should form a wrong judgment in such a case, it cannot cause any serious consequences; the progress of the abscess will speedily set him right.

A varicous state of the femoral vein may be the more readily mistaken for a rupture, since it admits of being reduced by pressure, increases by coughing, exertion, and the erect position, and is not perceived in the recumbent posture. In a case of this kind related by Sir A. COOPER*, where the swelling disappeared on lying down, pressure on the vein above the crural arch made it appear again. PETIT† has recorded an instance, which I insert here, as these cases are rare.

CASE.

“BEING at Courtray, in Flanders, I was informed by my hostess, that her maid-servant had in the

* Pt. ii, p. 9.

† *Tr. des Mal. Chir.* tom. ii, p. 299.

groin a tumour about the size of a hen's egg. It produced no inconvenience while she continued at rest, and disappeared spontaneously in bed: it came down again when she rose, and gradually increased to its ordinary volume. A sense of heaviness and pain was then perceived in the thigh, leg, and foot; and obliged her to take occasional rest. An itinerant charlatan, conceiving the tumour to be a hernia, supplied the patient with a bad truss, at a very dear rate. This occasioned such pain in the thigh and leg, that it could not be worn for an hour together. The doctor advised her to wear it only in the night; when its application was not attended with pain. I found this young woman in a state of great suffering, although the truss had been laid aside for two days. The colour of the tumour was rather brown; it could be returned with facility, and the skin then resumed its ordinary appearance; which convinced me that the peculiarity of colour arose from the contents. On continuing the examination, a swelling of the same colour appeared along the thigh, and a kind of cord could be felt by tracing the course of the saphena. Several large varices were found at the knee; and others, in greater number and size, about the malleolus internus. I was now fully persuaded, that the supposed rupture in the groin was a dilated state of the saphena, which, as we know, empties itself into the crural vein near the passage of the latter under the arch of the

abdominal muscles, and in the situation of crural herniæ."

Tumours composed of watery cysts*, and others of a more solid kind, have been observed about the situation of the crural arch. The history and symptoms would probably point out the nature of the case; and, even if such a tumour were mistaken for a rupture, the error could hardly give rise to any practical ill consequence.

* *Parisian Journal*, tom. i, p. 252; MONRO on *Crural Hernia*, p. 80.

CHAPTER XVI.

TREATMENT OF THE FEMORAL RUPTURE.

SECTION I.

Reducible Femoral Hernia.

A REDUCIBLE femoral rupture may be retained by a truss of nearly the same shape with that which is employed in bubonocoele. The distance from the curve to the end of the pad should be rather less, on account of the different relative position of the aperture. Since the instrument rests in the bend of the thigh, where it must interfere with the motions of the limb, the pad should be as narrow, from above downwards, as is consistent with the objects of the application; and it should be continued nearly in the same straight line with the spring, instead of being turned downwards. The crural ring, from its structure and situation, is less affected by external pressure than the abdominal canal. An advantage will be derived from bending the under edge of the pad backwards; so that its convexity, instead of being placed vertically, shall be turned a little upwards.

Crural herniæ are radically cured by means of trusses less frequently than those of the inguinal kind. The sides of the aperture appear, from their

structure, to be less capable of contraction, and they are certainly less susceptible of approximation from external pressure.

SECTION II.

Strangulated Femoral Hernia.

THE smallness of the opening, through which the parts descend, and of the tumour itself, have been noticed already. In consequence of the former circumstance, the incarcerated femoral rupture is distinguished beyond all others by the closeness of the stricture. In all the instances, where I have seen the operation, there has never been room to pass more than the tip of the operator's finger under the stricture; and frequently even this has been impracticable. I have constantly found the same state of parts in the dead subject, except in the remarkable case related above. In one instance, where the sac actually contained both intestine and omentum, I could not, after removing the protruded parts, force my fore-finger into the opening; and in another, where a complete fold of intestine had been engaged, the opening, after removing the gut, would

* In a case of very small crural enterocele, PELLETAN observes of the protruded intestine, "L'arcade crurale le serroit à un tel point, que je ne pouvois pas rencontrer le moindre espace pour introduire un instrument propre à inciser cette arcade: je n'y parvins qu'avec une grande difficulté," &c. *Clinique Chirurgicale*, tom. iii, p. 439.

not admit a full-sized bougie, without considerable pressure*. These circumstances will lead us to expect, as we actually find to be the case, that the femoral hernia easily becomes strangulated; that the closeness of the stricture diminishes the chance of reduction by any means but the operation; and that the great pressure, which the parts experience, renders delay very dangerous.

I think it right to insist more particularly on these points, because Mr. PORT has represented them in a directly opposite light: he states, that the femoral rupture seldom becomes strangulated; that the contents may generally be returned in the operation without any incision of the structure, on account of the "large space between the os ilion and os pubis, and that that space is occupied principally by cellular membrane and fat*." The anatomical incorrectness of this representation is obvious: I am authorized in stating that the surgical inferences are equally false, by having seen the operation performed in numerous instances, and having had several opportunities of examining this hernia in the dead subject. That I may not seem presumptuous in contradicting a surgeon, whose vast experience and sound judgment give so much weight to his opinions on a point, which must be determined by an appeal to facts, I shall quote the words of Mr. HEY, who has already noticed the incorrect representation of the writer above-mentioned. "These declarations surprise me exceedingly, coming from

* *Works*, vol. ii, p. 138.

the pen of an author, who wrote so much from his own experience, as I conceive Mr. POTT to have done. If we look at the skeleton, we shall undoubtedly see a considerable space between the os ilium and pubis; but if we take our ideas from a subject labouring under a strangulated femoral hernia, we shall rather wonder, from the smallness of the aperture, how a descent could have happened. I have now performed the operation for the femoral hernia fourteen times in the female, and twice in the male subject, and have always found great difficulty in introducing the smallest portion of my fore-finger into the femoral ring, for the purpose of conducting the bubonocèle knife. Nay, this introduction I have twice found impracticable, and have been under the necessity of making use of a director. In no case, in which I have operated, did there appear the least probability of reducing the prolapsed parts, without previously enlarging the aperture*."

I am happy to find that the opinion of Sir A. COOPER, as expressed in the second part of his valuable work on hernia, coincides so completely with my own experience on this very important point. This gentleman notices the comparative smallness of the crural rupture, and states, that he has found the means of reduction less frequently effectual in this than in the inguinal hernia; which he ascribes to two causes, *viz.* the unyielding nature of the parts, through which the hernia descends, and the smallness of the aperture, forming the mouth of

* *Practical Obs.* p. 150.

the sac*. He adds, “ that the delay of the operation, which he lamented and condemned, when speaking of inguinal hernia, is to be still more deprecated in the crural; for death very generally happens earlier in the latter disease than in the former.” The relation of a case follows, in which death took place in twenty-one hours and a half from the accession of the symptoms. In two others, at the end of forty hours the parts were so much altered that it was not thought proper to return them into the abdomen. After mentioning some other instances of the fatal effects of delay, Sir A. COOPER concludes by giving his opinion in the following terms. “ So strongly am I impressed with this belief, that if I were myself the subject of crural hernia, I should only try the effect of tobacco clysters; and, if they did not succeed, would have the operation performed in twelve hours from the accession of the symptoms†.”

The pressure of the opening on the neck of the sac occasions a thickening and induration of this part; which is more frequent here than in the inguinal hernia, in consequence of the narrowness of the opening.

In our attempts to reduce a crural hernia by means of the hand, the pressure must be accommodated to the peculiar course in which the parts descend. The general observations, which have been already made, concerning the position of the patient, &c. will apply here. As the crural arch and

* Pt. ii, p. 15.

† Page 32.

the fascia of the thigh are so immediately concerned with this swelling, the precautions of bending the hip, turning the limb inwards, and carrying the knee over the opposite thigh, are particularly necessary, in order to relax these parts. The pressure must first be exerted downwards and backwards, to push the swelling off the surface of Poupart's ligament; and if the parts recede under the application of the force in this direction, it should be continued upwards, in order to make them pass under the crural arch. It must be very obvious, from the description of the course in which the rupture descends, that no advantage whatever can be obtained by pushing the swelling upwards in the first instance. Let the practitioner remember, that the smallness of the mouth of the sac, and the consequent tightness of the stricture, diminish the chance of effecting a replacement of the rupture by means of the taxis; and consequently, that when the incarceration is completely formed, he should not waste much time in attempts of this description.

“ It is well known,” says Dr. BRESCHET*, in describing the practice of Mr. DUPUYTREN, “ that the operation for femoral hernia, when performed within twenty-four hours of the occurrence of strangulation, is almost always successful ; that strangulated ruptures, especially of the crural kind, are seldom replaced by the taxis ; that a delay of twelve or twenty-four hours, in the hope of accomplishing

* Lib. cit. p. 60.

this reduction, may cause very serious changes in the state of the patient, giving rise to peritonitis, or to gangrene of the intestine, when the surgeon feels himself obliged to operate, although convinced that there is very little chance of success."

The opinion and directions of Mr. BELL are to the same purport: "When symptoms announce the canal to be obstructed, and when we feel a small hard herniary tumour rising from under Poupart's ligament; when we have failed to reduce that tumour by the taxis, aided by bleeding, large purgative clysters, and the relaxation or deliquium produced by the warm bath, lose not a moment in performing the operation with the knife, for the danger is imminent*."

SECTION III.

The Operation.

THE operation for the femoral hernia will be performed in the same manner as that for the bubonocoele. The division of the integuments, beginning an inch above the crural ring, should run obliquely downwards and outwards. I prefer an incision in this direction to one which would cross the middle of the tumour, in compliance with the general practice; because it runs over that part of the ligament which I propose to divide, in order to set at liberty the strangulated parts; and thus we gain more room

* BELL, *Surgical Obs.* vol. i, p. 206.

for executing a part of the operation, which is rendered peculiarly difficult by the great depth at which the stricture is situated.

With the same object of gaining room, Sir A. COOPER* advises that two incisions should be made in the integuments, resembling the letter T reversed, and having their point of union in the middle of the tumour. The first of these passes perpendicularly over the upper half of the swelling, and is crossed at right angles by the second, which extends in a transverse direction. The angular flaps of the integuments, made by these incisions, are then to be dissected off on each side.

Mr. DUPUYTREN's external incision is crucial, or in the form of the reversed T. "The integuments are to be pinched into a fold corresponding to Poupart's ligament, and the surgeon, holding one end of this fold with his left hand, divides it in a course parallel to the femoral vessels, whatever the direction of the tumour may be. The upper end of this incision should be over the crural arch, or an inch, or an inch and a half higher. Each side of this wound is divided, so as to render it crucial, and the flaps are turned back†."

The structure and arrangement of the coverings, which invest the peritoneal sac, must be borne in mind by the surgeon in executing the second part of his operation, that of laying bare the hernial contents. I have many times seen considerable em-

* Pt. ii, p. 15. † Dr. BRESCHET; lib. cit. p. 169.

barrassment arise from an ignorance of this structure, in consequence of which the division of the fascia propria has led the operator to suppose that he had penetrated the true sac, and exposed the intestine, while it was still covered by peritoneum. But the merely temporary confusion is not the worst consequence of such a mistake : it has been attended in one instance with a fatal termination. After cutting through the first and most superficial investment, a surgeon returned the hernial sac with its fascia propria unopened, into the abdomen. As a free dissection was required, in order to separate it sufficiently for this purpose, the surrounding parts were left in such a manner, as, in conjunction with the neck of the sac, to continue the strangulation, and consequently to cause the patient's death *.

* COOPER, pt. ii, pl. vii, fig. iv. A case somewhat similar to this came under my own observation. The operation for crural hernia was performed unsuccessfully on a man. When the abdomen was laid open, the peritoneum at the crural arch appeared distended by a considerable tumour placed between it and the abdominal muscles. The omentum was continued into a round opening, with smooth sides, at the centre of the swelling. The latter part was composed of a large mass of omentum, adhering partially to the hernial sac, and placed between the abdominal muscles and peritoneum. The cellular connections between these had been destroyed, so as to admit of the membrane being separated to a considerable extent. The hernial sac had been laid open, but its neck was not divided ; and this constituted the round opening I have described in the middle of the tumour. When the narrowness of the stricture

The lymphatic glands, among which the femoral hernia is situated, are not only a source of difficulty in the diagnosis of the complaint, but often cause embarrassment in the operation. One or more of them may be enlarged, and situated in the course of the incision; the tumour, when laid bare, may present the appearance of a collection of indurated glands, and these may constitute much of the swelling, enveloping and concealing the comparatively small hernial tumour. If suppuration should have occurred in such glandular swellings, the difficulties are increased. The rupture itself is often irregular and sacculated, divided into compartments by frena and septa. A protuberance of the peritoneal covering sometimes appears, in such cases, as a serous cyst, or hydatiform tumour. Occasionally an empty and collapsed sac is situated upon the more recent protrusion: or closed serous cysts may be found on the outside of the sac. Lastly, the parts are sometimes included in a double sac. Mr. CHEVALIER* mentions two instances of this kind, "in which the sac containing the intestine was included within another sac, into which it had descended, so as completely to fill up the aperture, to which it firmly in crural hernia is considered, it seems difficult to understand how so considerable a bulk of parts could be returned: but further examination removed this difficulty. The crural arch had been completely detached from the pubes, so that the incision extended from the crural into the lower abdominal ring. Fortunately the spermatic cord was not injured.

* *Medico-Chirurgical Transactions*, vol. iv, p. 325.

adhered." Mr. DUPUYTREN* met with a similar case. "On opening the hernial sac, a spoonful of fluid escaped, and a substance resembling intestine presented itself. This was soon found to be another hernial sac contained within the former; it was opened with great care, when about the same quantity of fluid escaped, and a portion of omentum and of intestine were discovered."

Particular caution is required in opening the sac, as this hernia never contains more than a very small quantity of fluid; and as the protruded part is very frequently a portion of intestine, unaccompanied by omentum.

The direction of the incision for the removal of the stricture is a very material point of consideration, from the important parts which so closely surround the neck of the sac. If the knife be directed upwards and outwards†, the epigastric artery is greatly endangered‡. If we cut straight up-

* Dr. BRESCHET, in his *Considérations, &c. sur la Hernie Femorale*, p. 51. This work contains a very interesting series of cases from the practice of Mr. DUPUYTREN.

† In using the words *upwards and downwards*, I suppose the patient to be in the erect attitude.

‡ Division of the stricture upwards and outwards is recommended by RICHERAND and DUPUYTREN: the latter surgeon, who has often operated in this manner, both on males and females, has never met with any troublesome hemorrhage. He employs a curved probe-pointed bistoury, cutting on the convexity, and limits the incision to the small extent just necessary for the return of the parts. He finds the instrument just mentioned much more convenient than the bistoury of POTT, which embraces too great an extent of parts, and can only be made to act on the

wards, the spermatic cord is exposed to risk*. The latter source of danger does not, however, exist in female subjects, on whom the operation is performed in the great majority of instances. An incision of the most interior part of the stricture is free from all danger in the ordinary course of the vessels. But that variety, in which the obturatrix artery, arising from the epigastric, runs along the inner margin of the sac, seems to preclude us from cutting even in this direction. A mode of operating has been lately proposed with the view of avoiding this danger. We are directed to make an incision through the aponeurosis of the external oblique muscle, just above the crural arch, and in a direction parallel to that part: to introduce a director under the stricture from this opening, and to divide the tendon to the requisite extent by means of a curved knife passed along the groove†.

stricture by elevating the handle considerably, and carrying the blade in a curved line. The convex-edged bistoury is to be conducted flat on the palmar surface of the left fore-finger, carried in the same way under the stricture, and then turned up, when its cutting edge directly meets the part requiring division, and acts on it immediately and with precision. He carries the incision through the upper end of the falciform process, to the margin of the crural arch. BRESCHET, *Concours*, &c., p. 182, et suiv., and pl. iii, fig. ii.

* ARNAUD operated on a young man of twenty-two for crural hernia: he died in an hour after the operation, which had not been attended with any unusual bleeding. Division of the spermatic artery, and large effusion of blood into the abdomen, were found on examining the body. *Mem. de Chir.* ii, p. 755.

† *Edinburgh Med. and Surg. Journal*, vol. ii, p. 205. "The

If this plan were perfectly executed, it would undoubtedly remove all risk of injuring any of those parts, which are more or less endangered in the other ways of relieving the stricture. But it supposes a too perfect and familiar acquaintance with the anatomy of the parts to admit of being practised by surgeons in general. The attachment of the fascia transversalis to the crural arch, and the close connection of the hernial sac to the tendon in an old rupture must produce considerable difficulty. If the arteries run so near the crural arch as to be endangered by the other way of operating, there will be great risk of wounding them in this method: particularly if the parts should be obscured by bleeding. Lastly, the contents of the swelling would be inevitably exposed to danger, as the extreme closeness of the stricture does not admit of interposing any thing to guard them.

I consider the best and safest method of executing this part of the operation to be that of dividing the thin posterior border of the crural arch, in the part first recommended by GIMBERNAT; that is, as nearly as we can to its insertion in the pubes. This is the very part which constitutes the stricture, operation has been performed successfully in this way, in two cases, in the Royal Infirmary, by Mr. LAW." It seems that this mode of operating was first proposed by Mr. ELSE of St. Thomas's Hospital; COOPER, pt. ii, p. 17; Dr. HULL attempted it, but he could not succeed in passing a director under the stricture from above. Case of Ellen Livesey in *Med. and Phys. Jour.* vol. xi, p. 120; Mr. BORNETT found great difficulty in accomplishing it; COOPER, pt. ii, p. 18.

and where a smaller division will accomplish our object than in any other situation. Yet half an inch in all cases, and in many instances a longer space may be gained in this quarter, without affecting the main insertion of the ligament into the spine of the bone. The crural arch, therefore, is less weakened by a division of this than of any other part.

Strong testimony in support of these points may be derived from the advice of RICHTER, who recommends an incision in the same portion of the arch, without knowing the anatomical reason on which its propriety is grounded. The following passage shows his opinion on this subject; “ Je conseille en même tems de faire l’incision le plus près possible de l’angle interne de l’arcade, non seulement parcequ’on est plus éloigné de l’artère épigastrique; mais parceque la hernie passe principalement par cet endroit, *et qu’on obtient beaucoup plus d’espace lorsqu’on élargit cet angle* *.”

Mr. HEY has very candidly stated, that he had from experience gained a knowledge of the proper manner of performing the operation, before he had acquired from anatomical investigations a just idea of the part, which principally causes the strangulation. He adds, that he had often wondered, that so small a division of *the most interior part of the stricture* should be sufficient for reduction.

It will generally be practicable to introduce the

* *Tr. des Hernies*, p. 249. Or in his *Anfangsgründe der Wundarzneykunst*, vol. v, p. 449.

tip of the finger or of the nail under the edge of the tendon: the fibres of which should be carefully divided in succession, with the probe-pointed knife, until we have gained just sufficient room to replace the contents of the swelling*. When the tightness of the stricture prevents the operator from using his finger as a guide, he will employ the deeply-grooved curved director, introducing it as near as he can to the pubes. In both cases the blunt end only of the curved knife should be passed beyond the stricture, that the division may be effected without risk to the arteries, in case they should not follow their usual course. The intestine should be protected by the operator's left fore finger, while he is using the right hand in cutting the tendon; and if both his hands are employed, it may be held aside by an assistant; for the depth at which the stricture is situated from the surface, and the narrowness of the opening, occasion some danger of injury to this part, and this risk is considerably increased when the intestinal coats are weakened by ulceration, as described at the end of the chapter.

In this mode of operating we shall entirely avoid the spermatic cord, and the epigastric artery in the ordinary course of the vessel. It must be allowed, that in the less frequent distribution, which has been

* The way in which GIMBERNAT executes this part of the operation has always appeared to me to be very awkward and objectionable. He employs a director and curved knife, holding each of these in one hand, and then moves them both together along the surface of the bone. P. 45 and 46.

described above, the obturatrix artery will be endangered. The risk is not sufficient to induce us to exchange this for any other method, that has been hitherto proposed; as I know of none, which avoids the vessel more certainly, while in facility of execution, and in other advantages, this has the undoubted preference.

A calculation of the proportionate number of instances, in which we may expect to find the obturatrix artery running along the inner side of the neck of the sac, will much diminish our apprehensions concerning the danger of this vessel. The obturatrix artery arises from the trunk of the epigastric once in between three and four times*. Yet where the origin of the vessel thus deviates from its accustomed place, it generally takes its course

* Mr. J. CLOQUET examined the origin of the obturatrix artery in 250 subjects, half male and half female. He found it to arise

1. From the internal iliac on each side, in 160	{	87 males.
		73 females.
2. epigastric 56	{	21 males.
		35 females.
3. internal iliac on one side, }	{	15 males.
..... epigastric on the other }		
	...28	13 females.
4. crural 6	{	2 males.
		4 females.

In the entire number there were,

Obturatrix arteries from the internal iliac	348	{	191 males.
			157 females.
..... epigastric }	....152	{	58 males.
..... or crural, }			
			94 females.

Rech. Anat. p. 72, note.

along the outside of the hernial sac, and consequently is exposed to no danger *. That the other arrangement, in which the obturatrix artery is found on the inner side of the mouth of the sac, is very rare, is proved by the statements in the note at p. 407. The comparative number of instances, in which it is found on the opposite side, cannot be stated higher than one in twenty. If therefore we admit that the obturatrix artery arises from the epigastric once in four times, it would be endangered only once in eighty operations. And, if we consider, that by the precaution of introducing the knife to the very smallest distance within the stricture, that is compatible with effecting the cut, by the careful successive division of the tendinous fasciculi, and by carrying this division only just so far as to gain the necessary room for reduction, the artery may frequently escape; the probability of any unpleasant occurrence is so much diminished, that it hardly constitutes an objection, and certainly would not justify us in leaving this method for any but one that should be perfectly free from all danger.

All the evidence that I have been able to collect on this subject, concurs in demonstrating the safety of the above-mentioned mode of operating.

* “ In all cases (says Sir A. COOPER) which I have myself dissected, where this variety existed with crural hernia, the obturator has passed into the pelvis on the outer side of the neck of the sac, entirely out of the reach of any danger of the knife.”
Pt. ii, p. 21.

CASE.

— JOINS, a poor woman of the parish of Ampney, near Cirencester, about fifty years of age, had laboured under a strangulated femoral hernia for six* days, in which time all the usual remedies had been unsuccessfully employed. On performing the operation, a piece of omentum and a small bit of intestine were found to have passed under Poupart's ligament. Both these parts were of a deep red, and almost brown colour. I removed the omentum; and the divided edge did not afford the slightest hemorrhage. The stricture, which was very deeply seated, was manifestly formed by the thin posterior border of the crural arch. I divided it in the situation which I have recommended above, by conveying the probe-pointed bistoury in the groove of a director. The parts were now returned with ease, and the patient soon recovered. I have operated in the same way in other instances with equal success; and I have seen the same method employed by others without any unfavourable occurrence in consequence.

* The reader may think that this case does not accord with the representations I have already given concerning the urgent nature of the symptoms, and the rapid progress of crural herniæ. The circumstances sufficiently account for this deviation from the usual course. It must be remembered, that the intestine was protected from pressure by a mass of omentum; and the age of the patient must also be taken into the account.

In an instance, recorded by Sir A. COOPER, the operation was successfully performed on the eighth day; there also a large portion of omentum was protruded with the gut. Pt. ii, p. 24.

GIMBERNAT has operated in this way in four* instances: and Mr. HEY† employed a nearly similar method with advantage in a much greater number of cases. Sir A. COOPER's mode of operating, which must stand on exactly the same ground with that which I have recommended, as to the danger of wounding arteries, &c., has never been attended with any unpleasant consequence in the numerous instances in which he has practised it.

GIMBERNAT's operation has been objected to by Sir A. COOPER, who recommends a different method of removing the stricture. On account of the depth, at which the posterior margin of the crural arch is situated, and the closeness with which the protruded viscera are embraced by the tendon, he states that the intestine is greatly endangered: that it may easily get before the edge of the knife; or, if it be held aside sufficiently, it is exposed to the danger of laceration. He relates two cases, in which accidents of this kind have actually occurred, and caused a fatal termination. He is therefore in the habit of dividing the stricture on its anterior part, as far as the front margin of the crural arch, directing the edge of the knife upwards and inwards. If this is not sufficient, he afterwards divides the thin posterior border of the tendon, still carrying the knife in the same course. In the male subject he makes a small transverse incision above Poupart's ligament, and draws the spermatic cord out of the reach of the knife by means of a bent probe.

* P. 28 and 29.

† P. 150 et seq.

The want of a sufficient number of opportunities of trying both operations prevents me from forming a decisive opinion on the comparative merits of this proposal and that which I have already recommended. The thin edge of the crural arch has always appeared to me to be so materially concerned in forming the stricture; and it is so clear that a division of the part in question affords much more room than that of any other, that I consider this method as meriting the preference. A wound of the intestine can only be ascribed to the want of sufficient care on the part of the operator*.

The protruded intestine is often found to have undergone serious injury from the mechanical pressure of the stricture†, as mentioned at p. 51. The

* It must be acknowledged, that the tightness of the stricture, and its depth from the surface, are serious difficulties in performing this operation. If, therefore, sufficient room could be gained by dividing the parts between the mouth of the sac and the crural arch, on the anterior part of the rupture, in the way recommended by Sir A. COOPER, that method would be preferable. And when we consider that the falciform process is folded in at this part, and connected to the thin border of the arch, there can be no doubt that the stricture would be relieved to a certain degree. I would therefore advise this plan, with a caution not to extend the cut through the arch; and if sufficient room were not gained, the process recommended above may be followed. In all the cases in which I have operated, a division of the posterior thin edge of the crural arch has been necessary.

† This stricture on the bowel justifies the distinction drawn by SCARPA and Mr. BELL, between incarceration and strangulation. The intestine, says the latter, “is retained in the sac by *incarceration*, that is, in consequence of its distension; but there is no stricture on the blood vessels of the intestine: it is *strangulated*, which is that state, when not only the alimentary matter is ob-

smallness of the aperture, and the sharp, almost cutting edge of POUPART'S ligament, which forms its inner boundary, enable us to understand why this effect of strangulation, without being confined to cases of femoral rupture *, should be much more obstructed in the canal, but when the blood in the vessels is also obstructed, and there is momentary danger of mortification." *Surgical Observations*, vol. i, p. 179.

He observes further, that the protruded portion of bowel becomes distended by its own secretions; thus it is augmented in bulk, and consequently more confined by the stricture, and in imminent danger of strangulation. "As the included portion of intestine became filled (in a femoral rupture), the angle of reflection formed over the sharp edge of the stricture increasing every hour, the coats became so tightly drawn against the edge of the stricture, that they were first gorged with stagnant blood, and, finally, the circulation was stopped. *Strangulation* then took place, and *mortification*, or the *ulceration* of the intestine by pressure against the tendon." *Ibid.* 185.

The distinction between strangulation and incarceration would be of great practical importance, if it were indicated by the symptoms. The operation, which is the only means of relief in the former, is not so urgently required in the latter state. Neither the local nor general symptoms, however, afford any indications on which such a diagnosis can be grounded; the strangulation, in the meaning affixed to it by Mr. BELL, often proceeding even to mortification, without any characteristic change of symptoms.

* Several examples have been preserved by Mr. STANLEY in the museum of St. BARTHOLOMEW'S hospital: these specimens have been taken, partly from femoral, partly from umbilical herniæ. Mr. SWAN has observed the same occurrence in a congenital case. In examining the body, forty-eight hours after the operation, he found the intestine retaining the most distinct mark of the stricture, and "the bowel (ilium) was so changed at this part as not to be capable of admitting the point of the little finger." *Edinh. Med. Surg. Journal*, vol. xxi, p. 297.

frequent in them than in the other species of the complaint. The state of the intestine will vary, according to the degree of pressure, and the time it has existed. The bowel may be simply constricted, as if it had been tied firmly, without any division of its tunics. When removed from the body, and preserved in spirits, the constriction is permanent; but if it be pressed, handled, and gently extended, the natural dimensions are restored. With contraction, there may be an obvious thinning of the strictured part, from ulceration of the internal and muscular coats; when this has gone to its greatest extent, the serous membrane alone, which resists the longest, remains entire. Often this ulceration and thinning are confined to the internal side, opposite to the sharp edge of GIMBERNAT's ligament. The intestine first descends along the side of the femoral vein, and then suddenly turns forwards and upwards, so that it must be forcibly pressed directly against this part of the crural arch. Lastly, the serous membrane itself may have ulcerated, producing a small pin-hole, or a larger aperture into the intestinal tube, usually attended with a fetid fecal smell on laying open the sac.

This had occurred in the case related at p. 308. In a patient, who had laboured under strangulated femoral hernia for seven days, and died a few hours after the operation, Mr. CHEVALIER* found that "the protruded intestine had given way for nearly half its circumference, on that side which lay next the symphysis pubis, and from the aperture thus

* *Medico-Chirurgical Transactions*, vol. iv, p. 324.

formed the feces had escaped into the abdomen. No gangrene however, had taken place, but the opening appeared as if the intestine had been cut to that extent by a pair of blunt scissars."

If the constriction should have been circular, so as to intercept or at least interrupt the circulation of the part, and that for some days, the included portion may mortify, as in the instance just referred to. In a case of femoral hernia, operated on by Mr. DUPUYTREN, the protrusion consisted of a portion only of the diameter, about an inch long, and half an inch wide, which was found of a livid violet colour, and went in spontaneously, after the stricture had been removed. The patient died in forty-six hours, when the intestine was found adherent to the posterior surface of the crural arch, and to the mouth of the sac, "about two thirds of its calibre had been constricted, the other third remaining free. But the latter must have been intercepted by the prominence, or septum, formed at the junction of the two ends of the strangulated portion. This prominence must have been more considerable at the time of strangulation, because the two ends then formed a more acute angle: hence probably the interruption to the passage of feces and air. The circular impression left by the stricture was blackish, and very narrow (*linéaire*): the portion, which it circumscribed, was marbled, violet coloured, and covered by a slight glutinous stratum. Towards the centre was a white round spot, a slough, occupying the whole thickness of the bowel; separation had not yet commenced, but

as this slough was opposite to the mouth of the sac, and the rest of the bowel adhered to the neighbouring parts, if the patient had lived, no effusion would have taken place into the abdomen, on the detachment of the mortified part*."

The intestine, in these cases, is usually unadherent, and its general state and appearance are by no means unfavourable.

We have no data for determining exactly what time is necessary for producing the changes just described. That the injury to the part will be greater, the longer the compression lasts, is obvious; and this is another argument for an early performance of the operation. In an umbilical hernia, which I lately operated on, in six hours from the descent of the intestine, and where the constriction was so close, that the grooved director passed in with great difficulty, the protruded convolution of intestine was separated from the neighbouring part by a manifest circular constriction at each end, and was, throughout, of the deepest livid hue, apparently from the intercepted circulation. The patient died in forty-six hours. The bowel, which had been protruded, had partially lost its lividity, but the circular marks of the constriction were still visible; and ulceration of the mucous membrane had commenced at one point.

The generally favourable appearance of the intestine leads the surgeon, in these cases, almost without reflection, to return it into the abdomen.

* BRESCHET, lib. cit. obs. ii.

But the consequences of such conduct are not uncommonly fatal. The ulceration of the coats continues, the tube is penetrated, its contents escape into the cavity, and death speedily follows.

What course, then, ought to be pursued in such cases? Should we return the bowel, or leave it on the outside, in the wound, until the risk of its giving way shall have passed by? If the intestine should exhibit merely an impression from the stricture, and we are able, by careful examination, to ascertain that the coats are uninjured, or at least not visibly thinned by ulceration, the part ought unquestionably to be replaced; the natural diameter being first restored by carefully extending the constricted portion.

Instances are recorded, in which the bowel has been replaced, although nearly opened by the ulcerative process, and the patients have recovered. Mr. DUPUYTREN operated on a female, twenty-six years old, and found a portion of intestine three inches long protruded at the crural ring. It was reddish, or chesnut-coloured, and connected to the sac by recent adhesions. When the stricture had been removed, and a portion of the sound intestine drawn out, a whitish transparent mark, about two lines in breadth, was observed at the strangulated part; the intestine was here thinned, and seemed reduced to its peritoneal coat. It was replaced; and the patient recovered*. In another case† he

* Dr. BRESCHET; lib. cit. obs. 30.

† *Ibid.* obs. 16.

pursued the same practice with an equally favourable result, where “ the intestine presented a rupture (*èraillement*) of the internal and middle membranes, three or four lines in extent. The serous membrane alone was left. Did the pressure of the crural arch on the intestine produce this rupture, as a ligature divides the internal coats of an artery? Are we warranted in reasoning from analogy on the effects produced in tissues, which differ so widely in structure and properties?” To these fortunate cases we might oppose many instances of opposite results; of perforated intestine, fecal effusion, and death. Let the operator then observe the rule of gently drawing out the bowel, after liberating it from stricture, so as to ascertain its state, particularly on the inner side of the constricted portion, opposite to GIMBERNAT’S ligament. If he see no reason to apprehend perforation of the tube, he will replace the intestine in the usual manner; on the contrary, should this point appear doubtful to him, let him leave the part on the outside, rather than expose the patient to the irremediable danger of effusion into the abdomen.

A minute aperture in the bowel, if unattended with other mischief, might be closed by a fine silk ligature, according to the method described in the note, p. 309.

CHAPTER XVII.

ON UMBILICAL RUPTURES.

SECTION I.

Anatomy of the Umbilicus.

THE navel, if we understand by this word the cicatrix, usually accompanied with a depression, remaining after the separation of the navel-string, does not exist before birth.

The navel-string, which is larger in proportion to the body the younger the fetus, is covered for a few lines by a continuation of the abdominal integuments, which form a kind of sheath, terminating by an undulated margin, and distinguished by a clearly defined line from the smooth covering of the cord. The surface of the abdominal cavity, in the corresponding situation, is smoothly lined by the peritoneum, without any opening or depression; the umbilical arteries, vein, and urachus, lying between that membrane and the linea alba, and being accompanied in their passage through the tendinous ring only by cellular substance. If, however, the cord be pulled outwards, the peritoneum is drawn into a little depression or pouch; if we pass the end of the finger along the inner surface of the

linea alba, we find this opening to be its weakest part, and slight pressure, either with the finger or an instrument, forces the membrane into it.

The peritoneum may be easily separated by dissection, in a mature fetus, from the linea alba and the umbilical vein; and still more easily from the upper portion of the tendinous ring, under which the vein passes; a loose cellular substance only connecting the vein and the corresponding portions of the membrane and aperture. The umbilical arteries are more closely attached, both to the peritoneum and to the umbilical ring.

The latter consists, in its upper half, of strong semicircular tendinous fibres, with a well-defined margin, forming an arch under which the vein passes, connected to it by loose cellular tissue; the lower half is not so strong or well-defined, and its tendinous fibres are attached to the umbilical arteries, so that these parts cannot be separated without cutting those fibres.

The linea alba itself is less firm in the mature embryo than in a child of some weeks old; the umbilical ring is in its broadest and strongest part, and the tendinous fasciculi are here most strongly marked.

The only vessels in this neighbourhood are small and insignificant ramifications of the epigastric arteries and veins.

That portion of the cord, which remains attached to the body of the child, dries up after birth, as far as the edge of the small cutaneous sheath, which is

continued over its termination from the integuments of the abdomen. An ulcerated groove commences at this edge, and, extending from the circumference towards the centre, detaches the dried portion, and the surface cicatrizes. The process occupies from three to six days. The cicatrized portion forms the small oval depression called the navel, which feels rather firmer than the surrounding skin, and exhibits no trace of the umbilical vessels.

The latter are completely closed, and reduced into small firm cords, in the first weeks after birth. This change is so analogous to the invariable course of nature in other instances, where blood-vessels no longer transmit any fluid, that we feel a difficulty in believing the alleged examples, in which the arteries or vein are said to have been found open to the navel in the adult*. At that age the fibrous cords, which represent these vessels, are so slender, that we sometimes find it difficult to trace them from the navel to the liver or bladder.

These slender threads, with some thickened cellular substance, occupy the umbilical ring in the adult; the strong tendinous fibres of the linea alba are intermixed with them, so as hardly to present any appearance of an opening. The cicatrix of the integuments is connected to the same parts on the outside; and, as this adhesion is firm and insepar-

* BOEHMER *de necessaria funiculi umbilicalis deligatione*, in HALLERI *Dissert. Anat.* tom. v; HALLER, *Element. Physiol.* lib. xxx, sect. i.

able, the depression of the navel appears deeper and deeper in proportion as the individual grows fatter*.

SECTION II.

General Observations on Umbilical Ruptures.

THE terms *exomphalos*, *omphalocele*, and *umbilical hernia*, are applied to that species of rupture, in which the abdominal contents are protruded through the opening in the *linea alba*, which transmits the umbilical vessels of the fetus, or in the immediate vicinity of that part. Whether the protrusion take place most frequently in the former or in the latter of these two situations is a question, the determination of which can be of no practical consequence, although it might perhaps influence the name of the complaint. The term *exomphalos* can certainly be applied with propriety to that rupture only which occurs at the umbilicus; while any displacement of the viscera through the *linea alba* in the neighbourhood of the navel should be classed with ventral herniæ.

It was observed by PETIT†, that, in the adult,

* A minute account of the anatomy of the umbilicus, and its changes, illustrated by figures, will be found in SOEMMERRING'S German tract *on the Cause, Structure, and Treatment of Umbilical Ruptures*; Frankfort, 1811, 8vo.

† *Tr. des Mal. Chirurg.* tom. ii, p. 250. “La hernie ombilicale, proprement dite, celle qui sort précisément par l'anneau ombilical, est une maladie propre à l'enfance.”—SCARPA, p. 318.

the parts are most frequently protruded at one side of the umbilicus : but Sir A. COOPER * is of opinion that they usually take their course through that opening itself. It seems probable that there may be a difference in this respect according to the period of life at which the complaint occurs. The tendinous ring, which transmitted the umbilical vessels, does not immediately close after the formation of the cicatrix : it presents an aperture, through which the viscera may be easily protruded, under the action of those causes which are capable of producing ruptures. The parts, however, slowly contract ; and the navel gradually acquires that firmness, which characterises it in the adult. At this time the cicatrix possesses greater density and power of resistance than the neighbouring parts.

These anatomical facts will furnish us with two pathological inferences, the truth of which is supported by experience. First ; that infancy is more subject than any other age to umbilical herniæ, properly so called, where the viscera are protruded through the navel itself. Secondly ; that adults are more exposed to that species of the complaint, in which the hernia takes place in the vicinity of the umbilicus.

The point at which the hernia protrudes is under the superior arch of the umbilical ring, close to the passage of the vein. SOEEMMERRING † has found

* *On Crural and Umbilical Hernia*, p. 35.

† *Lib. cit.* p. 43 et seq. et fig. 6.

this in several exomphali, both of young and older subjects.

The form of the swelling varies according as the subject is fat or thin: in the latter case it is free and pendulous; in the former, larger at its basis, less prominent, and nearly hemispherical.

The umbilicus is not equally distended by the protrusion in every direction; it yields irregularly, and the cicatrix is usually seen on one side of the tumour.

The protruded parts will naturally tend downwards; so that the opening into the abdomen is from the upper part, and not from the middle of the swelling. As the rupture grows larger, this observation becomes more and more applicable.

If neglected, it increases very considerably, descending to the pubes, and even over the pudenda; subject to painful ulcerations very difficult to heal, incapacitating the patient for active exertion, and forming a constant source of intestinal affection.

When the subject is fat, the rupture may extend between the integuments and muscles, without causing any external swelling; nay, the navel may even present its ordinary concavity.

The opinions of different surgical writers concerning the sac of the umbilical hernia are much at variance with each other. Many foreign surgeons have denied the existence of a hernial sac in the exomphalos. The names of DIONIS*, GARENA

* *Cours d'Operations*, par DELAFAYE, p. 106.

GEOT*, and J. L. PETIT†, may be cited in exemplification of this remark. They state, that as the peritoneum has cicatrized at the navel, it must be burst by the protrusion of the viscera. SHARP‡ has met with a sac in the exomphalos, but seems to think that it is often wanting. The subject, long ago correctly stated by BARBETTE§, has been rightly represented by that excellent surgeon, Mr. POTT||. “Whatever,” says this celebrated writer, “are the contents, they are originally contained in the sac formed by the protrusion of the peritoneum.” He then adds, that this sac is very visible in recent and small ruptures, but that it cannot always be distinguished towards the navel in old and large ones. RICHTER¶ is undetermined on the point in question. He thinks it difficult to explain why the protruded viscera should not have the usual covering in this species of rupture; and he quotes SCHMUCKER and SANDIFORT as having observed a sac in cases of exomphalos. Yet he gives up his own opinion to the weight of authority, and concludes that an

* *Mémoires de l'Acad. de Chirurg.* tom. i, p. 702.

† *Traité des Mal. Chir.* tom. ii.

‡ *Critical Inquiry*, p. 50.

§ *Opera Chirurgo-Anatomica*; Lugd. Bat. 1672, p. 33.

|| *Works*, vol. ii, p. 165. Other writers have also described the existence of a hernial sac in exomphalos. See MORGAGNI, *Epist.* 34, art. 11; HALLER, *Opusc. Pathol.* obs. 29 et seq.; SANDIFORT, *Obs. Anat. Pathol.* lib. i, p. 74; VERDUC, *Pathol. de Chirurg.* tom. ii, p. 482.

¶ *Traité des Hernies*, ch. xxxv.

umbilical rupture, occurring in the adult, is not covered by peritoneum.

The erroneous notion, that the viscera are not included in a hernial sac, in the case of exomphalos, has arisen from a mistaken supposition that the umbilical vessels perforate the peritoneum at the part where they enter the body of the fetus. This error could never have been entertained by a person acquainted with the true structure of the parts, since he must have known that the peritoneum is just as entire here as in any other situation of the abdominal parietes. It does indeed often happen, in consequence of that membrane being closely connected to the inflected cicatrix of the integuments, that the distinction between the skin and hernial sac cannot be traced on the front of the tumour; but it is even then most easily discerned in every other part of the circumference. In other cases a hernial sac can be demonstrated over the whole exomphalos, just as clearly as in any other species of rupture*.

The umbilical hernia is not only furnished with a true peritoneal sac, but it possesses likewise a more superficial investment, derived from a condensation of the surrounding cellular substance.

A practical precept, derived from the supposed want of the hernial sac, of proceeding with great

* For representations of the hernial sac in various umbilical ruptures, see the 10th plate of SCARPA; also fig. 1 and 2, pl. 9, of Sir A. COOPER'S *Anatomy, &c. of Crural and Umbilical Hernia*.

caution in exposing the contents of an umbilical rupture, which requires the operation, is just as necessary as if the anatomical observation, which suggested it, had been strictly correct. The hand of a prudent operator will be guided by this maxim in every species of rupture; but the present case certainly requires a more strict attention to such a precaution, since in many cases the integuments and hernial sac cannot be distinguished on the front of the tumour. It may indeed be noticed, as a general observation, that the coverings of an umbilical rupture are frequently very thin. The pressure of the contents in a large and old exomphalos produces sometimes a more or less complete absorption of the sac, which will account for several phenomena that have been observed in these cases, and may likewise excuse the incorrect opinion as to the want of a hernial sac. The contained viscera have been found in many instances adhering to the integuments*. Sir A. COOPER† has seen portions of the omentum contained in an exomphalos passing through openings in the sac, which must have been produced by absorption; and has even known intestine to be strangulated in a similar aperture‡.

* ARNAUD on *Hernias*, p. 323; and in the *Mem. de Chirurg.* tom. ii, p. 590. He mentions in the latter work an instance in which the bowel adhered to the skin so strongly, that it was cut in dissecting the parts after death.—MONRO *Obs. on Crural Hernia*, p. 24; COOPER on *Crural and Umb. Hernia*, p. 37.

† Libro citato, p. 36.

‡ *L. c.* p. 46.

Besides the causes, which have been stated in the general description of herniæ, there are some of a local nature, which will act particularly in contributing to the formation of umbilical ruptures. In dropsy the navel is often distended into a pouch, which however contains nothing but the ascitic fluid. Under the great accumulation which takes place in some instances, the tumour has burst. The enlargement of the abdomen in pregnancy often produces this rupture, by weakening the navel or immediately surrounding fibres of the linea alba; and excessive corpulency acts in the same way in both sexes.

The distention of the linea alba by the gravid uterus so strongly favours the occurrence of exomphalos, that the number of females afflicted with this rupture very greatly exceeds that of males. Of 71 cases observed in Holland, only 17 were men*: in 479 patients with umbilical herniæ, relieved by the City of London Truss Society, there were 387 women. (See the note in chap. i, sect ii, p. 14.)

If we put out of the question the operation of this particular cause, it will be found that navel ruptures are much less frequent than the inguinal or femoral kinds. The smaller size and firmer structure of the umbilical aperture, its higher situation in the body, and its not being exposed, as the abdominal and femoral rings are, to the perpendicular pressure of the viscera, are sufficient causes for this differ-

* SOEEMMERRING, *Ueber die Ursache, &c. der Nabel Brüche*, § 59.

ence. MONNIKHOFF* saw 71 exomphali in 2,000 ruptures; and CAMPER† informs us, that of 1,968 cases, for which trusses were delivered at Amsterdam, there were only 10 umbilical herniæ. Of 7,599 cases relieved by the City of London Truss Society, 479 were umbilical, 770 femoral, and 6,262 inguinal. In this number there were 6,458 males, of whom only 92 had exomphali, while of 1,141 women, 387 had navel ruptures. (See the note at p. 14.)

The contents of an exomphalos are the omentum, with or without a portion of intestine. An umbilical rupture in the adult rarely contains intestine unaccompanied by omentum. A large strangulated exomphalos, however, on which I operated with success, contained small intestine only, of which there were several convolutions. The relative situation of the parts in the belly explains why the omentum often surrounds and envelops the intestine. The transverse arch of the colon is the gut most frequently protruded in this hernia, as we might indeed have inferred *a priori* from considering the natural situation of the part in the abdominal cavity; but the presence of the small intestine is by no means an unfrequent occurrence; and even the cœcum has been protruded at the navel.

A patient labouring under exomphalos is still more subject, than those with other herniæ, to colic,

* SOEEMMERRING, loco citato.

† *Dissertationes decem*, vol. ii, p. 522.

flatulence, vomiting, and the various species of intestinal derangement. Hence particular attention is required to the quantity and quality of the food, and to the preservation of the digestive organs in a healthy state.

From the description of the umbilicus, it will immediately appear that the contents of this rupture can become strangulated only by the margin of the tendinous opening in the linea alba; it is susceptible of no other species of incarceration*.

I shall divide the observations, which I have to make on the treatment of umbilical hernia, into three parts, according to the natural and essential distinctions in the complaint. These divisions will be; first, congenital exomphalos; secondly, that which occurs in young subjects; and thirdly, that of the adult.

SECTION III.

Congenital Umbilical Hernia.

THE first species of the complaint may be termed congenital with the greatest propriety; for it exists at the time of birth. It is even found in the youngest embryos†; so that we can have little hesitation in as-

* The case which I quoted above, from Sir A. COOPER, of strangulation by an opening in the sac, being a single instance, will hardly justify us in forming an exception to this general assertion.

† ALBINUS delineates an example of it in an embryo less than

cribing it to an original deficiency in the formation of the part. Hence perhaps the term rupture is not strictly applicable to it: indeed, from the situation of the fetus in utero, and the absence of respiration, the occurrence of a rupture seems hardly possible before birth, except in the case of the testicle carrying with it through the ring a preternaturally adherent portion of intestine or omentum.

The tumour appears as if formed by the dilatation of that extremity of the umbilical cord, which is connected to the child's body. Generally it has a more or less conical figure: the basis is attached to the abdomen, and the round tendinous opening, by which the viscera protrude, occupies its centre: the umbilical cord appears to arise from the apex of the swelling. The coverings are thin, soft, and seem transparent, so that the contents can be readily perceived externally. The external surface is polished, and exactly resembles, both in appearance and structure, that of the cord. The base of the swelling is covered, for a short extent, by integuments. Internally the cavity presents a smooth peritoneal production, which lines it throughout.

The umbilical vessels are generally divided by the

two inches in length; *Annot. Acad. lib. 1, tab. 5, fig. 3.* WRISBERG represents it in an embryo of ten weeks; *Descriptio Anat. Embryonis*, &c. fig. 1 and 2; or in SANDIFORT'S *Thesaurus disp. anat. v. 3*: and Dr. HUNTER, in his *Anatomy of the gravid Uterus*, tab. 33, fig. 3. SOEEMERRING has met with two analogous instances; *über die Ursache, &c. der Nabel Brüche*, p. 31; and another is represented by SCARPA in his tenth plate, fig. 3.

swelling; the vein going above, and the arteries below, or on one side*.

The deficiency in the abdominal muscles, causing this congenital species of umbilical hernia, is by no means an unfrequent occurrence, both in its greater and smaller degrees. Dr. HAMILTON† of Edinburgh has usually seen about two instances of it annually, in the last seventeen years. A German writer‡, in a dissertation on this subject, refers to thirty-eight recorded cases; besides which several examples of it have been seen by HALLER§, MORGAGNI||, WRISBERG¶, SANDIFORT**, BONN††, SOEMMERRING‡‡, HEY§§, and others|||.

* The anatomy of the congenital umbilical hernia is represented by SCARPA, pl. 10, fig. 1 and 4.

† COOPER, on *Crural Hernia*; p. 57.

‡ FRIED, *de fœtu intestinis plane nudis extra abdomen propendentibus nato*; in SANDIFORT's *Thesaurus diss.* v. 1.

§ *Opuscula pathologica*; or in the *Opera minora*, vol. iii, p. 315. Two cases.

|| *Epist.* 48, art. 48 and 53.

¶ In RUDOLPHI, *diss. de peritonei diverticulis, illisque imprimis quæ per umbilicum et lineam albam contingunt*; Goett. 1780: Three cases.

** *Obs. Anatomico-patholog.* Lugd. Bat. 1778. lib. i, cap. iv, & lib. iii, tab. 1: also in *Museum Anat. Acad. Lugd. Bat.* 1793, tab. 120 and 126.

†† *Transactions of a Society at Amsterdam, for promoting Medical Knowledge*; vol. ii, p. 133. Several cases.

‡‡ *Abbildung und Beschreibung einiger Missgeburten*, 1791, tab. 8 and 10; *über die Ursache, &c. der Nabel Brüche*, p. 31 et seq. Five cases.

§§ *Practical Observations*, 3d ed. p. 232 et seq. Three cases.

||| VAN DOEVEREN, *Specimen Observ. Anat.* cap. ii. BUCH-

The most common contents of the tumour are a portion of small intestine; but we may find in it the large intestine, omentum, stomach, liver, and spleen.

The deficiency of the abdominal parietes is found in very different degrees in different instances; hence the quantity of parts unnaturally situated, the bulk of the tumour, and the chances of recovery are very various.

Sometimes the tumour, containing merely a small portion of intestine, has been so inconsiderable as to be unnoticed at first: SABATIER* has seen the intestines wounded in the act of tying and dividing the cord in such instances, and the same circumstance has been witnessed by others†. There may be a swelling of greater magnitude, though still of moderate size, equal, for instance, to a hen's egg, containing nothing but some convolutions of

HOLTZ *de Hepato-omphalocoele congenita*. Argentorat, 1758. An excellent description with plates. DEWIND, *Transactions of the Society of Sciences at Flushing*, 1775. DE MAN, *Transactions of the Haarlem Society*, v. 19, p. 179. STARKE, *Archiv für Geburtshülfe*, &c. vol. i, tab. 1 et 2; vol. iii, p. 89; vol. iv, p. 646. AMYAND in *Philos. Trans. abridged*, vol. vii, p. 529.—RUYSCH, *Obs. Anat. Chir.* obs. 71—73. VOIGTEL contains an immense number of references; see his *Handbuch der Patholog. Anat.* vol. ii, p. 370—372.

* *De la Médecine Opératoire*, tom. i, p. 152.

† PARÉ, lib. 23. cap. 66; MAURICEAU, *Traité des Accouchemens*, tom. i, p. 497; *Miscellan. Nat. Cur.* Dec. 2. Ann. 3, obs. 128.

small intestine. We may undertake the treatment of such cases with great prospect of success.

In a second description of cases, where either the whole or the largest part of the intestinal canal is contained in the hernial tumour, we have little reason to expect that our curative efforts will be successful; yet we should not be discouraged from such attempts at relief as the circumstances admit.

There is a third and yet more extensive degree of this unusual formation, in which the very nature of the affection seems to preclude all hope of assistance from the art of surgery. The dissection of such cases has shown the liver, stomach, spleen, omentum, large and small intestines, lying in the umbilical tumour*. Often too it has been accompanied by malformations of other parts.

The instances in which the whole anterior and lateral parts of the abdominal parietes are deficient, so that the viscera lie exposed on the surface of the body, seem to be only more complete specimens of the latter kind of deformity; and should therefore be classed under a common head with the above mentioned cases. SOEEMMERRING † has delineated this kind of unnatural formation; which I have seen

* MERY, *description de deux exomphales monstrueuses*, in the *Memoires de l'Acad. Royale des Sciences*, 1716, p. 126; HALLER *Op. Minor*; tom. iii, p. 316; SOEEMMERRING, *Abbildung*, &c. tab. 10. fig. 3; DEWIND, as quoted before.

† *Abbildung einiger Missgeburten*, tab. 8. Many similar facts are quoted in VOIGTEL *Handbuch der Pathologischen Anatomie*, vol. ii, p. 313.

more than once, both in the human subject and in animals.

Treatment *.

It comprehends, as in other herniæ, the twofold object of replacing the contents of the swelling in the abdomen, and preventing a renewal of the protrusion. The necessity of accomplishing these points is more urgent here than in ordinary ruptures; because that part of the coverings of the tumour, which consists of an expansion of the cord, will dry up and separate after birth, so as to expose

* RUYSEN appears to have found this congenital deficiency in the structure of the navel constantly fatal; and not to have attempted any thing in the way of cure. Perhaps he met with it only in its worst form. “Multoties infantulos vidi in lucem editos, quibus abdominis cutis et musculorum pars in ambitu funiculi deerant, magnitudine solidi argentei, ita ut intestina eo loco, tenuissimâ tantum pelliculâ tegerentur. Hunc affectum sæpius a me visum, ast nunquam curatum memini: omnes enim ab utero ad tumulum delati fuere, 5to, 6to. 7mo, 8vo, aut 9no die.” *Observ. Anat. Chir. Obs. 71.*

SCARPA'S experience seems to have been nearly similar in its result: “Les enfans, qui naissent avec une hernie ombilicale, vivent, pour l'ordinaire, fort peu de tems; soit parce qu'ils ont, presque toujours, d'autres vices de conformation dont les suites sont plus dangereuses, tels que le spina bifida, le développement incomplet des os de la tête, la foiblesse des muscles abdominaux, un gonflement énorme des viscères du bas-ventre, et particulièrement du foie; soit parceque les parties qui forment la hernie, sont, dans la plupart de ces cas, irréductibles à cause des fortes adhérences qu'elles ont contractés avec le col du sac herniaire.” P. 324.

the parts, if they be still prolapsed ; an occurrence highly dangerous, if not inevitably fatal.

For the purpose of confining the parts, when replaced, compresses with bandages, or the ligature, have been employed. The former method was adopted with success by Mr. HEY.

CASE.

“ IN November, 1772, I was desired to visit an infant born with an uncommon tumour at its navel. I found the funis umbilicalis distended to the bulk of a hen’s egg at its insertion into the abdomen ; though it was of its usual thickness in every other part. The distention of this part of the funis had rendered its external coat so transparent, that I could clearly discern through it the folds of the small intestines, which had been protruded through the navel, before the child was born. I immediately reduced the intestine, and desired an assistant to hold the funis compressed so near to the abdomen, that the intestine might not return into the hernial sac. I procured some plaister spread upon leather, cut into circular pieces, and laid upon one another in a conical form. This compress I placed upon the navel, after I had brought the skin on each side of the aperture into contact, and had laid one of the lips a little over the other. I then put round the abdomen a linen belt, and placed upon the navel a thick circular quilted pad, formed about two

inches from one extremity of the belt. This bandage kept the intestine securely within the abdomen, and was renewed occasionally. The funis was separated about a week after birth; and at the expiration of a fortnight, from that time, the aperture at the navel was so far contracted, that the crying of the child, when the bandage was removed, did not cause the least protrusion. I thought it proper, however, to continue the use of the bandage a while longer *.”

A congenital umbilical hernia of three inches diameter was cured in the same way in a month †.

Dr. HAMILTON has communicated, in a letter to Sir A. COOPER ‡, a successful instance of a different mode of treatment in a very similar case. After reducing the contents of the swelling, and applying a tight ligature round its base, the Doctor states, that he brought together the edges of the parietes abdominis by means of two silver pins and adhesive straps, and that in a few days the cure was complete.

Mr. HEY's treatment is preferable to that of Dr. HAMILTON; being much safer, and having proved equally successful.

When, as it very frequently happens, the tumour is of a more considerable size, its cure is more

* *Practical Observations*, 3d ed. p. 232.

† BUCHHOLTZ, in his tract already quoted, *de Hepato-omphalocele Congenita*.

‡ *On Crural and Umbilical Hernia*, p. 56.

doubtful, although it would certainly be the surgeon's duty to make the attempt. Mr. HEY* returned the parts in a case where the whole intestinal canal seemed to be contained in the swelling, which projected four inches from the body, though the aperture was very small: the patient only lived two days. In another case, where the tumour burst during parturition, he carefully replaced the viscera, but the termination was fatal †.

SECTION 'IV.

Umbilical Hernia in young Subjects ‡.

THE contraction of the tendinous ring of the linea alba, and the consolidation of the cicatrix, in which the fibrous cords representing the former umbilical vessels, the inflected integuments of the navel, and the aponeurotic fibres are firmly united together, proceed gradually after the separation of the cord: the parts do not acquire at once that solidity which they possess in the adult. The period of life in which this process is going on is particularly favourable to the occurrence of exomphalos; and a much greater number of such ruptures takes place in the first months after birth, than in all the subsequent years.

* *Practical Observations*, 3d edit. p. 234.

† *Ibid.* p. 233.

‡ SCARPA, tab. x, fig. 2.

That there is a natural weakness of construction, favouring protrusion in particular individuals, is probable; although it cannot be stated on the ground of actual observation. Young children are subject to many of the occasional causes of herniæ; such as violent exertions of the abdominal muscles in long-continued crying, convulsions, and coughing; distention of the stomach and bowels from colic, constipation, and the various intestinal affections; absurd and not yet universally exploded practices of tight swaddling clothes and bandages.

Surgical writers have assigned other causes of a more local nature, and dubious efficacy: thus some have ascribed umbilical herniæ to cutting off the cord too short, and some to leaving it too long. A neglect of the supposed necessary precaution of keeping up pressure by means of compress and bandage, after the separation of the funis, has been very generally represented as a cause of navel ruptures in infants.

The necessity of this umbilical bandage appears to me extremely doubtful; but its injurious effects, when narrow and tight, are evident and certain. Not to mention the painful nature of such restraint on a part naturally moveable, and designed to move freely in the various functions executed by the thoracic and abdominal organs, we cannot doubt, that if it should prevent protrusion at the navel, it must be by favouring it at the groin or bend of the thigh.

“I am very much mistaken,” says SOEMMER-

RING, "if I have not, both as a father and a physician, seen many ill effects from the unnecessary and injudicious employment of umbilical bandages. My opinion has been asked concerning the rejection from the stomach of the best and most natural milk by healthy and quiet children. On feeling the abdomen, I have found it closely girt by a bandage applied with the view of preventing a navel rupture. Finding every thing natural about the umbilicus, I have ordered this bandage to be laid aside, and the evil immediately ceased*."

When we observe that animals, in whom the horizontal position of the body is attended with a perpendicular pressure of the abdominal viscera against the umbilical region, always escape umbilical ruptures, we shall probably suspect that the assistance of a bandage is not necessary in the human subject. At all events, it need not be employed unless we should notice some swelling or elevation of the navel after the cord has separated. In that case, we should use a bandage not less than three fingers in breadth; and be careful not to fasten it too tightly. A prominent navel is sometimes seen in children, who have worn such a bandage for months after birth; while the occurrence of exomphalos cannot be traced, in any instance, to the neglect of this measure.

I should consider, however, that a strip of adhesive plaister, applied across the belly so as to close

* *Ueber die Ursache, &c. der Nabel-Brüche*, p. 73.

the umbilical ring, is preferable to any bandage in what nurses call starting of the navel.

Although we should have expected these herniæ to occur very soon after birth, it appears, from the numerous observations of DESAULT, that they take place most frequently at the second, third, and fourth months; he states indeed that the complaint appears at this period in nine cases out of ten. The abdominal contents, protruded against the opening by the repeated cries of the child, distend and dilate it, and, carrying before them a portion of the peritoneum, form a small tumour, which gradually increases in size, and possesses the usual characters of a rupture.

The presence of the protruded parts maintains the umbilicus in an open state, and opposes the natural tendency of its margins to contract. This disposition, however, sometimes exceeds the resistance of the hernial contents, and, forcing them back into the cavity, obliterates the opening through which they had proceeded, consolidates the parts, and thus produces a spontaneous cure. DESAULT has furnished us with two examples of this kind*. A child of two years old was brought for his opinion concerning an umbilical tumour, produced some months after birth, in consequence of the whooping-cough. The swelling, which equalled in size a large nut, yielded to the pressure of the finger, but returned on the least exertion of the abdominal

* *Œuvres Chirurgicales de DESAULT par BICHAT*, tom. ii, p. 318.

muscles. DESAULT proposed the ligature, but could not obtain the consent of the relations; when this patient was seen for another complaint, the following year, the tumour had completely disappeared. The parents stated that no external application had been used, but that the swelling went away spontaneously.

In another patient, aged five years, an umbilical rupture had subsisted from the time of birth. The application of the ligature, which had been recommended by DESAULT, was delayed in consequence of the appearance of the small-pox. When the child had completely recovered, it was found that the tumour had diminished in size, and that the opening, through which the viscera had protruded, had become considerably contracted. Struck by this phenomenon, DESAULT conceived that nature alone might accomplish a cure, and did not interfere with the progress of the case. In the course of a few months the swelling had entirely disappeared.

SOEMMERRING* and BRUNNIGHAUSEN† have both seen several instances of even considerable umbilical ruptures in young persons disappearing in the course of years without any surgical assistance.

The disposition of the umbilical ring to close, manifested in such occurrences, is an important circumstance in treating the complaint; but it must

* *Ueber den Nabelbrüchen*, p. 74.

† LODER'S *Journal für Chirurgie*, B. ii, p. 1.

not be relied on exclusively, since spontaneous cures are by no means frequent. In general, when the progress of a case is left to nature, the cure in the course of time becomes nearly impossible. The umbilical ring gradually loses its disposition to contract; so that the aperture would not become obliterated at this period, even if the protruded viscera were kept in the reduced state. Hence we perceive that there is a very essential difference in the nature of the umbilical rupture, as it occurs in the infant or the adult; and that this distinction is derived from the tendency to contraction in the tendinous ring. In the former case a radical cure is easily obtained; in the latter it is nearly impossible. In the one instance it is sufficient to keep the viscera within the abdomen, and the ring will contract of itself. In the other the opening remains, whether it be occupied by protruded viscera or not. Hence also it follows, that practical observations, drawn from one form of the complaint, cannot be applied to the other.

In treating that species of exomphalos, which we are now considering, our object is to obtain a radical cure. By returning the protruded parts, and keeping them reduced, the umbilical ring will contract, and become obliterated, so as to prevent any future protrusion. There are two methods by which this may be attempted, *viz.* compression, by means of bandages; and the ligature. The latter has in its favour the sanction of antiquity, but was almost superseded by the general adoption of the

former method, when the celebrated DESAULT again brought it into use, and recommended it very warmly on the authority of his extensive experience. I shall present the reader with the result of the practice of the French surgeon, in his own words; and hope that the length of the extract will be excused, from the celebrity of the author, and the importance of the subject; particularly when it is considered, that the work* from which it is taken has not been translated into the English language.

“The ligature and compression are both employed with the same object; that of preventing the viscera from remaining within the umbilical ring, and thereby favouring the approximation of the sides of the opening. In the first of these methods, the hernial sac, and the integuments which cover it are removed; and the cicatrix formed after their destruction opposes the displacement of the bowels, while the margins of the opening, obeying the natural impulse which leads them to contract, and irritated by the operation which they have undergone, approach to each other, and unite, so as to obliterate the ring. In the treatment by compression, the place of the deficient portion of the abdominal parietes is supplied by a foreign body applied externally, which keeps the intestines within the cavity, so that they cannot offer any obstacle

* *Œuvres Chirurgicales de DESAULT, par BICHAT.*—See the “*Memoire sur la Hernie Ombilicale des Enfants,*” tom. ii, sect. iv.

to the contraction of the umbilical ring. The two processes are founded therefore on different principles, and reason and experience prove that their results differ accordingly.

“ It must be allowed, that compression is attended with no pain, but it produces inconvenience and restraint during the whole long space of time for which it must be continued. The ligature causes a momentary pain, but is attended with no subsequent restraint; it produces in a few days what compression only effects, when it succeeds, in several months.

“ In the one case, a constant and long-continued attention is required; if the treatment be suspended for the shortest interval, a great risk is incurred of losing the benefit previously gained: in the other, on the contrary, the object is attained to a certainty in spite of the cries of the child, and independently of the attention of its nurses. The margins of the opening being compressed in the former method, the natural action of the parts must be impeded; while in the latter, by superadding an artificial irritation to the tendency which the parts naturally have to contract, the obliteration of the opening is hastened and assisted.

“ When compression is employed, it is produced by means of a flat body, or of a round or oval substance adapted to the form of the opening. In the former case, if the bandage is applied with precision, the skin and sac, forming a fold, are pushed into the opening, and impede its obliteration by producing

the same effect from without inwards, which the protruded viscera did from within outwards. The other method is exposed still more strongly to the same objection. By the ligature, the hernial sac and integuments are removed, and there is no obstacle to the obliteration of the opening. If the means of compression be not applied accurately, and kept uniformly in their proper situation, a portion of omentum, or bowel, may escape, and frustrate the object of our attempts. Supposing the compression to succeed, both methods accomplish the closure of the navel: but, under the employment of the ligature, there is superadded to the contraction of the aperture, an agglutination of its sides produced by the operation, and conferring a degree of solidity on the union, which can be obtained by no other process.

“ Experience confirms the theoretical statement which we have just given of the comparative merits of the two methods of treatment. On one side, we shall find the successes of compression occur amongst its failures; and we shall see the infants, on whom it is employed, suffering for years the trouble and inconvenience inseparably attending it. The ligature, on the other hand, as employed at the Hotel Dieu, presents an uninterrupted series of well attested cures, which have amounted in the practice of DESAULT to more than fifty. In the latter years of his life, parents often brought their children to the public consultation, where the operation was performed immediately, and without any preparation.

The patients were afterwards brought daily to the hospital, to be seen and dressed until the cure was completed.

“ To these considerations must be added others, which will have some weight in influencing our determination. A poor person insures the cure of his child, by passing a few days in a hospital, under the employment of the ligature: while, if compression be used, he is exposed to the frequent repetition of expense for the purchase of bandages, and to loss of time in paying the attention which this mode of treatment indispensably requires.

“ The ancients employed the ligature in various ways; but the proceedings which they have transmitted to us may be referred to two heads. One consisted simply in returning the viscera, and placing a ligature on the integuments and sac: in the other, the swelling was opened either before or after the application of the ligature, to ascertain that the parts were all completely returned. CELSUS* adopted the first of these methods: PAUL of Egina chose the second, and was followed by all the Arabian physicians, and by those more modern practitioners, whose knowledge was derived from Arabian authors. The works of AVICENNA, ALBUCASIS, and GUY DE CHAULIAC prove this assertion.

“ We shall not be long at a loss in determining which of these methods deserves our preference. One is less painful, and equally certain; for surely a person can have no difficulty in deciding, by press-

* *De Medicinâ*, lib. vii, cap. xiv, *de umbilici vitiis*.

ing the sides of the sac against each other, whether or no the protruded parts are completely returned. The other, with an useless cruelty, adds to the pain without increasing the certainty of the operation. This last has been generally adopted; and PARE', who describes it, does not even mention the other method. Other variations again took place in the manner of operating. Some simply tied the base of the tumour, while others transfixed it with one or two needles in order to make the ligature more secure; and sometimes even made circular incisions with the same object. It is particularly in the Arabian writings that we meet with this process, which is not only cruel but superfluous; as the ligature, when properly applied, never fails. It is also described by PARE'; but SAVIARD, the only modern practitioner who has treated the exomphalos by means of ligature, followed the method recommended by CELSUS. SABATIER, in his learned work on the operations, speaks of both methods without deciding which merits the preference. The operation of DESAULT, nearly resembling that of SAVIARD, is simple, and attended with very little pain. It is performed in the following manner:

“The child, on which it is to be performed, should be laid on its back, with the thighs a little bent, and the head brought forwards on the chest. The surgeon, having returned the protruded viscera, presses on the opening with one hand, while with the other he raises the sides of the sac, and slides them between his fingers, to ascertain that no part

remains unreduced. When he has assured himself that the parts, which he holds, consist of nothing but the integuments and hernial sac, his assistant passes a waxed ligature of moderate size several times round their basis, securing it at each turn with a double knot, drawn with sufficient tightness to cause an inconsiderable degree of pain. The tumour, being thus tied, should be covered with lint; over which there should be applied one or two compresses fastened on by a circular bandage, which should be secured by means of a scapulary.

“ On the succeeding day a slight swelling of the tumour is perceived, analogous to that which occurs in a polypus, after tying its basis, and attended with no pain. On the second day the parts shrink, and the ligature becomes loose: its place should be supplied by another drawn rather more tightly. The application of this second ligature is generally rather more painful, from the increased sensibility of the parts, consequent on the first operation. The swelling now soon loses its colour, and becomes livid and flaccid; and a third ligature entirely intercepts the circulation. The part usually falls off about the eighth or tenth day, and leaves a small ulcer, which soon closes under the application of dry lint. The umbilicus has acquired by this time such a firmness, that it does not yield at all to the impulse occasioned by coughing, or any other exertion of the abdominal muscles. It is, however, advisable, as a matter of precaution, to continue the use of a circular bandage for the two or three months immediately following

the cure, lest the salutary operations of nature, employed at this time in the gradual obliteration of the umbilical opening, should be retarded by the pressure of the viscera against the parts.

“ We could recount a multitude of cases, in which the practice above detailed is confirmed by experience. But several have already been published in the *Surgical Journal**, and an addition to their number would only lengthen these remarks unnecessarily. It is sufficient to state, that since the publication just alluded to, DESAULT has performed the operation in a vast number of instances with uniform success. Children were brought to him every week at the public theatre where he lectured, and had the ligature applied in the presence of the students; they were then taken home, and brought back daily to be dressed until the cure was complete.

“ It may still be doubted, says SABATIER, in quoting an article from the *Parisian Journal*; where DESAULT speaks on this subject, whether the children have been radically cured: the hernia may have returned at some future period. A multitude of facts may be adduced to dispel this suspicion: several patients were brought to the public consultation of DESAULT for other complaints, long after the period of the operation, and were found on examination to have the umbilical opening completely obliterated, and to be free from the slightest impulse of the viscera against the aperture, in consequence

* There is an account of nine cases treated in this manner in the *Parisian Chirurgical Journal*, vol. ii, p. 189—199.

of coughing, sneezing, &c. Most of the surgeons of the Hotel Dieu are acquainted with patients radically cured by the operation of DESAULT; and I myself know two young persons operated on four years ago, and now entirely free from the complaint.

“ The event of this operation, which succeeds almost invariably in infants of an early age, becomes less certain in proportion as they grow older. This observation will be confirmed by the following cases :—

“ A child of eighteen months was brought to the clinical lecture of DESAULT, to undergo the operation for umbilical hernia, which was performed by means of the ligature, in the usual manner. The tumour fell off on the seventh day : and on the seventeenth the ulcer had cicatrized. At the expiration of six months this patient was brought again to the hospital, and was found by the pupils to have no trace remaining of its former complaint.

“ A boy four years old was operated on in the same way. The separation took place on the eighth day ; and on the twentieth the parts had completely healed. An impulse of the viscera against the opening, which had not become entirely closed, could be perceived two months afterwards, in spite of the precaution of wearing a bandage, which had been observed constantly since the operation. At the end of the sixth month, however, this symptom had entirely disappeared.

“ A girl of nine years old was brought from the country for an umbilical rupture, which had sub-

sisted since the time of birth. DESAULT, whose opinion was asked on this case, advised the operation, which he had never hitherto practised at so advanced an age. It was performed with success, and the wound healed speedily: but two months afterwards the swelling began again to appear. A bandage was applied, but, in spite of this, the swelling in six months had become as it was originally.

“The latter fact appears to contradict the experience of CELSUS, who operated as late as the fourteenth year. It illustrates, however, the principle formerly laid down, that the disposition, which the umbilical aperture has to become closed, is lost after a certain period. In the three preceding cases the event seems to have been completely influenced by the age of the subjects. A perfect cure was effected at eighteen months; it was obtained with difficulty at four years; and a complete failure took place at nine. In several other instances, where operations have been performed at so late a period, the result has been the same.”

We cannot regard the preceding statement of the opinions and practice of DESAULT, as an impartial account of the result of general experience concerning the comparative merits of the different modes of treating umbilical ruptures. Having adopted and constantly employed the ligature, this great surgeon ascribes to it a safety and certainty of operation, which the experience of others has not confirmed; and he has not fairly represented the advantages of compression.

“ I have attended carefully,” says SCARPA, “ to the phenomena and success of this operation, performed sometimes by means of the simple ligature, sometimes by passing it through the tumour; and, after a very considerable number of practical observations, I feel myself authorized to say, that neither the one nor the other mode of operating is exempt from violent, and sometimes even dangerous symptoms; and that neither of the operations produces a truly radical cure, without the assistance of compression continued for several months after the wound is cicatrized. It is not so uncommon, as some surgeons have represented, for the operation to be followed by violent fever and very acute pain, which cause continual crying, and even convulsions. The separation of the slough is followed by an ulcer, large and difficult of cure, which becomes occasionally fungous, and painful *”

Sir A. COOPER also objects to the operation, on the ground of its painful and occasionally dangerous consequences†.

It has been asserted‡ that the complaint returned, even in many of the cases operated on by DESAULT, and supposed by him to have been radically cured; and hence, after the subject had been fully debated in the Medical Society of Paris, the general deter-

* Mem. v, § 16.

† *On Crural and Umbilical Hernia*, p. 40.

‡ RICHERAND, *Nosograph. Chirurg.* tom. ii, p. 453; CARTIER, in the *Journal de Medecine*, tom. xli.

mination was, that the ligature ought to be abandoned*.

Compression is altogether free from the painful and dangerous consequences, that occasionally follow the use of the ligature; and has been found by RICHTER†, COOPER‡, SCARPA§, and SOEMMERING||, at least equally certain in its operation.

The situation of the swelling, and the age of the patient, are unfavourable to the employment of elastic bandages. The surgeon should take a convex solid body, adapted to the size of the opening. RICHTER particularly recommends half a nutmeg wrapped in linen; Sir A. COOPER a portion of ivory; and SOEMMERING a piece of cork. When

* The grounds of this determination, alleged by the Society, are: “ 1. Parceque la guérison des hernies ombilicales s’opère très souvent, par les seules forces de la nature; 2. parceque la compression seule, ou aidée des moyens toniques, reussit constamment; 3. parceque cette opération mérite le triple reproche d’être douloureuse et non exempte de dangers, si l’on est assez malheureux pour comprendre une portion d’intestin dans la ligature; de ne pas réussir ordinairement, sans être aidée de la compression; et d’être parfois pratiquée inutilement, comme DESAULT lui même en rapporte des exemples.” *Journal Gen. de Médecine*, tom. xli, p. 349, note.

† “ J’ai vu beaucoup d’enfans attaqués d’exomphales, et je ne m’en rappelle pas un qui n’ait été guéri par l’usage du bandage: on ne peut point en dire autant des adultes.” *Traité des Hernies*, p. 236.

‡ *On Crural and Umbilical Hernia*, p. 40.

§ *Mem.* 5, 15, & 16.

|| *Ueber die Nabel-Brüche*, § 72.

the viscera are carefully returned, let this body be placed over the opening, and covered with a circular portion of sticking plaister, over which strips may be applied crosswise, so as to bind it firmly in its place. A belt surrounding the body is sometimes necessary. As the motion of the child may occasion a change in its position, it should be rather broader in front; and it may be either quilted, or strengthened with a piece of leather at this part, to prevent it from becoming wrinkled.

SOEMMERING* has found the following method sufficient without any bandage or other addition. Sew a hemisphere of cork, covered with leather, and accommodated to the size of the umbilical aperture, in the centre of a piece of leather about three inches in diameter; and spread the rest of the leather with the most adhesive plaister. The parts being reduced, this plaister is to be applied, so that the cork shall press exactly on the opening. A spare one should be always ready in case of need. It will remain in its place, in quiet children, from eight to fourteen days; and will accomplish a cure, under favourable circumstances, in two months.

In proportion as the child is younger, so much the more speedily and certainly do these means produce a radical cure, which will be effected in two or three months, and sometimes in a shorter period. The chance of success is diminished according to the age of the child, and the duration of the complaint.

* *Loco citato.*

If the treatment be not adopted at an early age, the complaint will probably continue through life.

When we are endeavouring to obtain a radical cure by means of compression, it is important that the parts should be kept constantly reduced; for if they are suffered to protrude at any time, the progress of the cure must be retarded. Hence, when a change of bandage or plaister is required, we should carefully prevent any protrusion by placing a finger on the part, and keeping it there until the applications are renewed. As the management of infants devolves so entirely on females, the principles and object of the treatment should be clearly explained to the mother or nurse, that they may know how to act in any emergency.

SECTION V.

Umbilical Hernia in the Adult.

AN umbilical hernia in the adult must be treated on the same principles as an inguinal or crural rupture.

When reduction is attempted, the patient should be placed in the recumbent position, with his shoulders and pelvis a little elevated, and the thighs bent on the trunk, so as to relax the abdominal muscles as much as possible. The circumstance of the opening being ordinarily at the upper part of the tumour must be regarded.

When the tumour is small in size and reducible, it may be kept up by means of a truss made like that for bubonocoele. The pad and neck of the truss should be continued in a straight line with the rest of the spring; and the latter part ought to extend beyond the spine*. When the patient is very fat, so that the navel is depressed, the concavity may be filled, according to the suggestion of Sir A. COOPER, with a hemisphere of ivory, on which the pad of the truss should rest.

Mr. HEY of Leeds describes a truss for the exomphalos and ventral hernia, invented by Mr. EAGLAND, surgical mechanician of that place, and recommends it to the public, on the ground of a four years' trial in various cases, having found it to sit easy upon infants as well as adults, and to answer its purpose more effectually than any other instrument. It is formed of two semicircular springs of cast steel, well tempered and japanned. The posterior end of each semicircle is furnished with a quilted pad, resting at the side of the spine; and,

* RICHTER and SCARPA have found a truss of this kind to answer very well in umbilical ruptures. “*En faisant à ce bandage (the common inguinal truss) un léger changement dans sa figure, on peut le rendre très propre à l'exomphale. Il faut donner à la pelotte une forme ovalaire ou même ronde, et ôter la courbure du col de manière que le ressort représente un demicercle élastique, et on obtient par ce moyen le meilleur bandage pour l'exomphale, que l'on puisse désirer : c'est le seul dont je me serve, et que je recommande comme le plus sûr.*” RICHTER, p. 240. See also SCARPA, Mem. 5, § 17.

when the instrument is put on, the two are united by a buckle and strap. The front end is fastened by a vertical brass hinge to a small plate of thin steel, which supports the pad pressing on the opening. The springs are covered in the usual manner. The steel plate is covered externally with morocco leather, and, on the inner side, with one thickness of doe leather, to which is firmly stitched a cushion of blanket and lining leather, containing a piece of cork of a proper shape and size. The pressure of the springs keeps this pad closely applied to the umbilical region; while the hinges, which unite them to the steel plate, impart all the flexibility that is necessary for accommodation to the various motions and attitudes of the body*.

If the hernia is irreducible, in place of the piece of cork, a concave plate of steel, adapted to the tumour, and lined with soft leather, should be substituted. It will protect the swelling, and prevent its further increase.

This plan is only applicable to an irreducible exomphalos of moderate size. If its magnitude be

* Umbilical trusses of a more complicated construction have been devised; one is described in the 2d vol. of the *Mem. de l'Acad. de Chir.* by Mr. SURET; and it was approved by the academy. JUVILLE has a similar one in his treatise. The object of both these is to admit of the truss enlarging and contracting according to the varying dimensions of the abdomen. RICHTER has rendered this truss more simple; p. 239. SCARPA has described several different trusses for umbilical herniæ. *Mem.* 5, § 17 — 20.

considerable, other means of supporting it must be resorted to; such as suspending it over the shoulders by bandages passed under the swelling, or connected to a laced corset, fitting closely to the chest.

Rigorous attention to diet, and to the state of the intestinal functions, is indispensable in these cases. The food should be easily digestible, and taken in small quantity at a time; and a daily evacuation of the bowels should be regularly procured. In this way we guard as much as possible against flatulence and costiveness, which, by distending the belly, tend directly to augment the tumour. Of all ruptures the umbilical are the most frequently attended with indigestion, colic, flatulence, pain in the belly, &c.; and irreducible cases are still more subject than others to these intestinal disorders.

The treatment of an umbilical rupture, when strangulated, must be conducted on the principles laid down in the general observations on this subject. The surgeon should bear in mind, that the intestinal disorders, which occur so frequently in persons afflicted with this malady, particularly if it is old, large, and irreducible, are often severe, and assume an aspect more or less similar to that of strangulation. He must remember, also, that the immediate neighbourhood of the stomach, and its close connection with the omental portion of the hernial contents, which is hardly ever wanting, expose that organ to irritation in various ways, and

produce nausea and vomiting, quite independent of strangulation.

In all cases where we see reason to suspect that constipation or intestinal disorder of any kind, rather than incarceration, is the source of the mischief, active purgatives in small bulk, to avoid offending the stomach, will be most likely to afford relief. Calomel in doses of five or ten grains combined with opium, if the state of the stomach requires it, will answer our purpose best. It may be followed by small doses of Epsom salt at short intervals.

During the employment of these means, leeches, ice, or other cold applications to the tumour, if it be inflamed or painful, will mitigate the local disorder, and often produce much benefit.

If these internal and external means should not prove successful, the tobacco clyster still offers considerable chance of relief; in failure of which we must proceed to the operation. This, however, is undertaken with less prospect of success than in inguinal or crural herniæ. The greatest practical writers have strongly represented the frequent fatality of the operation for strangulated exomphalos; and the results of my own experience coincide entirely with their statements. I have, indeed, operated successfully on a large intestinal exomphalos, containing several convolutions of small intestine, of a bright red colour, without any omentum, in a fat woman advanced in years; but the majority of cases, in which I have either operated myself, or

seen the operation done by others, have ended fatally*.

Perhaps this fatality may be in some degree explained by considering, that the exomphalos is most frequent in fat gross subjects, unfavourable for operations; that general intestinal disorder either exists with the rupture, or is very easily excited; and that irritation and inflammation are most readily propagated to the stomach, which is close to the umbilicus.

The surgeon should remember, in performing this operation, that the coverings of the hernia are often very thin, and that the integuments and sac are generally inseparably consolidated on the front of the swelling. His incision may extend longitudinally over the whole tumour, beginning half an inch or an inch above the opening in the linea alba; or it may resemble, in conformity with the advice of Sir A. COOPER, the letter T inverted; the longitudinal portion of the cut terminating on the middle

* AMYAND has recorded two instances of exomphalos, with mortification of the intestine, followed by complete recovery. *Philos. Transact.* vol. xxxix, pp. 338, 341. Another may be seen in the *Journal de Med. Chir. &c. ou Recueil Periodique*, tom. vii, p. 53; and a fourth, in which an artificial anus remained, in the same work. PELLETAN operated in the case of a fat woman, with a very large exomphalos, and bad symptoms. The whole tumour was a collection of mortified parts and feces. The unloading of the alimentary canal from the operation produced great relief, and the woman recovered with an artificial anus in a very short time. *Clin. Chirurg.* iii, 90.

of the swelling, and a transverse incision crossing the tumour at right angles with the former, so as to join its lower end. The stricture may be most conveniently removed by cutting upwards: no danger, indeed, can arise from giving the incision any other direction*, as there are no blood vessels of any importance in the neighbourhood. The curved blunt-ended bistoury, carefully conducted by the left fore finger, which should protect the protruded parts, may be employed for this purpose. The edges of the incision should be carefully brought together after the operation, and united by sutures.

As the risk, with which this operation is necessarily attended, makes it advisable to diminish the subsequent inflammation and irritation, as far as lies in our power, I should be inclined to employ in a case of exomphalos, if the tumour exceeded a moderate size, that mode of operating which I have described as applicable to large inguinal herniæ; in which the tendon is divided without opening the sac; or the latter part is only cut sufficiently to allow the division of the stricture†. This will permit the return of the parts if they are not adherent; and if adhesions should have formed, the immediate cause of

* Some authors give directions for avoiding the umbilical vein; a caution, which is altogether superfluous.

† There can, I think, be no doubt, that in the unfortunate case of exomphalos, related in the chapter on omental ruptures (see p. 283), the patient would have had a much better chance of surviving, had the operation been performed in this manner.

danger, the strangulation, is removed. The approximation of the sides of the wound by sutures, or adhesive plaister, will prevent the occurrence of inflammation in the tumour. The practicability of this mode of operating in umbilical ruptures is fully proved by two cases recorded in the work of Sir A. COOPER*: and the successful termination of both instances proved the judgment and sagacity which had suggested that peculiar treatment.

For the same reason, if we meet with intestine strongly adherent, we should be content to remove the stricture, and to cover the gut by drawing together the integuments over it.

A similar plan may be followed with adherent omentum. By leaving these preternaturally-connected parts in the wound, we avoid the irritation of a long and painful dissection; while the union of the integuments over them will probably obviate the occurrence of inflammation.

The general principles already explained, in the chapter on mortified herniæ, are applicable to the treatment of an exomphalos, in which the intestine has become gangrenous. If the patient recovers after mortification of the whole intestinal diameter, an artificial anus remains. SCARPA explains this from the want of that process of peritoneum, which in inguinal and crural herniæ forms the connecting medium of the two ends of the gut, and constitutes

* Part ii, p. 51 and 55.

his "membranous funnel." In exomphalos the gut adheres to the edge of the opening nearly on a level with the skin, and the peritoneum cannot be drawn in towards the abdomen, as in inguinal or crural ruptures.

If, however, a small opening only be made in the intestine, either by the gangrene of a portion of the diameter, or by ulceration produced by worms, or indigestible substances, the canal may be restored here just as well as in any other situation.

CHAPTER XVIII.

ON CONGENITAL* RUPTURES.

SECTION I.

Congenital Hernia in the Male Subject.

THIS case differs from the common scrotal rupture merely in the circumstance of the protruded parts being contained in the tunica vaginalis testis, and consequently lying in contact with the testicle itself, covered only by its tunica albuginea. The hernial sac is formed, therefore, by the vaginal coat of the testicle.

The differences between a congenital and an or-

* The term *hernia congenita* was applied to this affection by HALLER (*de herniis congenitis*, Götting. 1749, 4to. *Opuscula patholog.* Lausan. 1754, 8vo.) ; and the name is sufficiently justifiable, if we consider that the state of parts favouring its occurrence exists at birth, although the rupture itself may not be formed till a subsequent period. From this Latin term the English epithet *congenital* has been derived. I cannot understand for what reason Mr. POTT and some others have exchanged this for the appellation *congenial* ; which, according to its common use and acceptance, must be perfectly absurd, as applied to this or any other kind of rupture.

dinary scrotal rupture are less important in practice than in pathology; for the symptoms and treatment are nearly the same in both species.

The fact, of the viscera being occasionally found in contact with the testicle, was observed by surgeons long before the circumstances, leading to this peculiar modification of the complaint, had been investigated and explained. As the sac of the scrotal hernia lies in close contact with the tunica vaginalis, it was formerly supposed, that the pressure of the protruded parts might cause a preternatural communication between the two cavities; and thus the phenomenon in question was accounted for. The true nature of the complaint was ascertained about the middle of the last century; when the labours of several celebrated surgeons and physiologists threw much light on the whole subject*. It is now well under-

* See HALLER *Programma, herniarum observationes aliquot continens*, Goetting. 1749; and in *opusc. patholog.*; see also his *opera minora*, tom. iii, p. 311 and seq.; POTT's *Account of a particular kind of Rupture, frequently attendant on new-born children, and sometimes met with in adults*; London, 1765; CAMPER, *on the Causes of numerous Ruptures of newly-born children* in the *Harlemische Abhandlungen*, vol. vi, p. 235, and vii, p. 58; HUNTER's *Medical Commentaries*, pt. i, Lond. 1762, cap. ix; *of the Rupture, in which the testis is in contact with the intestine*, p. 70; and *Supplement to the first part of Med. Com.* 1764, p. 6; CAMPERI, *icones herniarum*, tab. x et xi; NEUBAUER *Dissert. de tunicis vaginalibus testis et funiculi spermatici*, Giessen, 1767; LOBSTEIN *de Herniâ Congenitâ, Dissertatio Anatomico-Chirurgica*, Argentorat. 1771; containing an excellent account of the subject, as well in an historical, as in an anatomical and surgical point of view; GIRARDI in J. D. SANTORINI *tabulæ septendecim posthumæ*, p. 185;

stood that the testis is situated originally in the neighbourhood of the kidney, where it receives a covering from the peritoneum, in the same way as the other abdominal viscera derive their external investment; that in the latter months of uterogestation, it passes through the abdominal ring into the scrotum, carrying with it a portion of peritoneum; that this peritoneal production, constituting the tunica vaginalis testis, is at that time a prolongation of the great bag of the peritoneum, analogous to the sac of a hernia, and opening like it into the abdomen; that the communication between the membranous bag, holding the testis, and the abdominal cavity, is destroyed before the time of birth by the contraction and obliteration of that part of the peritoneal production, which is continued from the upper end of the

GIR. tab. ii; PALLETTA *nova gubernaculi testis Hunteriani et tunicæ vaginalis descriptio anatomica*, Mediolani, 1777; WRISBERG *Observat. Anat. de testiculorum ex abdomine in scrotum descensu ad illustrandam in Chirurgia de herniis congenitis utriusque sexus doctrinam*; in the *Commentationes reg. soc. scient. Götting.* 1778; and in WRISBERGII, *Commentationes*, vol. i; DE PANCERA *Diss. de testis humani in scrotum descensu*, Viennæ, 1778; BRUGNONI in *Mémoires de Turin*, 1784 and 1785; ROL. MARTIN *Commentarius de herniæ, sic dictæ congenitæ, ortu et sede, et de partium corporis fætus, quæ ad ejus illustrationem pertinent, administratione anatomica*; in *Nov. act. reg. soc. scient. Upsalien-sis*, vol. iii; SANDIFORT, *icones herniæ congenitæ*, 4to. L. B. 1781; VICQ D'AZYR *Recherches sur la structure et la position des testicules*, in the *Mem. de l'acad. des sciences*, 1780; LANGENBECK has more recently described and delineated the change of position, which the testicles experience, in his *Commentarius de peritonei structura*, &c. c. tab. æn. Goetting. 1817.

testis to the ring; and that the peritoneal coat, which surrounded the testis in the abdomen, gives the gland its external polished surface, while the more loose process, that passes with it into the scrotum, forms the tunica vaginalis testis*.

* The numerous descriptions of the descent of the testis, which are already before the public, render it quite unnecessary for me to enter on that subject on the present occasion. I shall merely present the reader with the observations of WRISBERG concerning the period at which this body changes its situation, and the varieties which occur in the process.

Before the beginning of the sixth month, the testis is always contained in the abdomen; and is generally near the kidney, but it may be behind the ring: this circumstance therefore affords a criterion respecting the age of a fetus. The situation of the testis near the kidney is represented by WRISBERG, *Descript. anat. Embryon.* fig. 4, and by GIRARDI in SANTORINI, *tab.* see GIRARDI, *tab.* ii, fig. 2.

ARNAUD mentions, in his French translation of HUNTER's account of this subject, that J. HUNTER had met with a fetus of six months, in which one testis had passed completely into the scrotum (see *Mem. de Chirurgie*, tom. i, note to p. 25); and WRISBERG himself, on a subsequent occasion, states that he had found both testes in the scrotum in an embryo of four, and in another of five months (See LODER's *Journal für die Chirurgie*, B. i, St. ii, p. 175).

The scrotum during this time is very small: and contains nothing but a soft cellular tissue, together with the termination of the fibrous cord constituting the gubernaculum testis.

In the interval, between the beginning of the sixth and the end of the seventh month, it may be seen above the ring, or in its passage through the opening, or just below it. When it has passed the tendon of the external oblique, it may still at first be pushed back into the abdomen, as the opening of communication is not yet closed. Occasionally this may be done even for some

If this obliteration should not take place, the parts remain just as they were immediately after the testis had passed into the scrotum. Instead of lining the abdomen smoothly in the inguinal region, the peritoneum exhibits a round aperture, the commencement of a membranous canal, which leads in front of the spermatic cord into the tunica vaginalis testis *. The membrane forming this tunic,

time after birth. In the eighth month these organs have generally passed the ring, but have not descended into the scrotum ; the tunica vaginalis communicating with the abdomen, or the intermediate canal being closed. Ordinarily both testes have arrived at the bottom of the scrotum in the ninth month, and the communication has closed ; but it may be open on one or both sides.

Of one hundred and three children, which WRISBERG carefully examined for this purpose at the time of birth, seventy-three had both testicles in the scrotum : in twenty-one, one or both were in the groin ; of these, five had both, seven the right, and nine the left, in the groin : in twelve, four had both, three the right, and five the left, only in the abdomen.

In one of the last division, the descent took place on the day of birth, in three on the second day, in three on the third, in two on the fifth, and in one on the twenty-first day : in the remaining three the testes had not appeared at the fourth or fifth week, when the infants left the hospital. In two there was a hernia on the right side.—*Commentat. soc. reg. Scient. Gotting. 1778 ; or Commentat. Anat. Med. Physiol. &c. vol. i.*

* It should appear, by the observations of CAMPER, that the canal of communication is generally open at the time of birth. He dissected seventeen newly-born children for the purpose of ascertaining this point. He found the canal open on both sides in eleven of these ; it was obliterated entirely on one side, and only in part on the opposite, in five ; and in one only it was completely destroyed on both sides.—“ *On the causes of the ruptures*

instead of terminating at the upper end of the gland, as it usually does, is continuous, by the membranous canal just mentioned, with the peritoneum. Such an arrangement of parts, presenting a sac ready formed for receiving any protrusion of the viscera, renders the occurrence of a hernia very probable. The parts are propelled, along the membranous canal in front of the cord, into the tunica vaginalis testis, and the complaint assumes, under these circumstances, the peculiarities which constitute a congenital rupture. It is still necessary, that the causes, which give rise to herniæ, should act in this case as well as in any other; since the mere existence of the communication is not sufficient for the production of a congenital rupture. In quadrupeds the tunica vaginalis communicates with the abdomen, and yet protrusions of the viscera are very rare*. In like manner the canal sometimes remains open in the human subject, to even the adult age, without the occurrence of rupture†. The term *con-*

which occur so frequently in new-born children," in the *Transactions of the Dutch Society of Sciences at Haarlem*, vol. vi and vii; in Dutch. These papers are also contained in his *Dissertationes edit. a HERBELL*, 8vo. Lingæ, 1800. My own observations do not agree with this statement; I have generally found the canal closed at the time of birth. CAMPER asserts further, that the canal is closed earlier on the left than on the right side, and explains, from this circumstance, the more frequent occurrence of herniæ on the latter side.

* WRISBERG saw a scrotal hernia in a horse; and observes that monkeys have been affected in the same way.

† HESSELBACH found the processus vaginalis peritonei open on

genital therefore is not applicable to this hernia in its strict sense, as it does not usually exist at the time of birth: it generally appears soon after this period, but it may be delayed, even for many years*.

It seems probable, that an accidental circumstance may give rise to the complaint, where it is strictly congenital. WRISBERG observed a small prominent fold of the peritoneum, continued from the upper end of the testis to the end of the ileum or the cæcum, in some subjects, and forming a preternatural connection between these parts. The change of situation in the testis would be probably attended, in such a case, with a descent of the connected intestine. An adhesion of the omentum or intestine to the testicle in the abdomen may cause these parts to pass through the ring, when the testis itself descends, or may even retard, or totally prevent the descent. In an infant, which had only one testicle in the scrotum, and died a few hours after birth, WRISBERG† found the opposite one close to the ring, and connected to the omentum by means of three slender filaments. In two congenital her-

both sides, in a man thirty-eight years old, in whom no protrusion of the abdominal contents had occurred. *Med. Chir. Zeitung*, 1819, p. 110. See also the observations of Mr. CLOQUET, quoted at p. 183.

* “Rarissimé, si unquam, talis hernia in recens natis jam adest, sed testem serius protrusum aut presso pede sequitur, aut accidente aliquâ causâ occasionali, contenta post menses vel annos in saccum haud oclusum propelluntur.”—CALLISEN, *pars poster.* p. 494.

† *Comment. reg. soc. scient.* Goetting. 1778, p. 71.

niæ, which existed at the time of birth, when the contents were returned, the testis was drawn up towards the ring*. The same author also found the omentum adhering firmly to the testis, in a case which he examined in the adult, although there was no adhesion to any other part†. In a child, born with a hernia on the right side of the scrotum, and who died three months after birth, the protruded parts were the cæcum, with its appendix vermiformis, and the extremity of the ileum. The appendix adhered firmly to the testis and to the sac‡. It was a preternatural connection of the omentum, by a single thread, to the testicle, that rendered the rupture of the celebrated ZIMMERMAN irreducible; and for which he submitted to the operation, on account of the various troublesome and painful symptoms which the complaint occasioned§. SOEEMERRING|| found the appendix vermiformis adhering to the testicle. In a case of congenital hernia figured in the *Commentarius* of LANGENBECK (tab. x) the intestine adheres to the testicle, but to no other part. It would be useless to adduce any further instances in confirmation of this opinion, as the experience of most individuals must have furnished opportunities of observing

* Ibid. p. 43 — 44.

† Ibid. p. 71. A similar case is mentioned by PELLETAN, *Clin. Chirurg.* tom. iii, p. 332.

‡ *Icones herniæ congenitæ.*

§ MECKEL *de Morbo Hernioso congenito singulari, &c.* Berolini, 1772.

|| DANZ *Zergliederungskunde des ungebohrnen Kindes*, vol ii, p. 164.

how frequently the viscera are connected to the testis in congenital ruptures. I shall therefore content myself with referring on this point to the opinion of Mr. POTT; who not only states in general terms, that adhesions are much more frequent in this than in other ruptures, but particularly notices the strength of the connection, which frequently subsists between the prolapsed viscera and the testis, and the difficulty which is experienced in destroying it*.

Adhesions between the testicle and the neighbouring viscera, instead of causing congenital hernia, may prevent the descent of the testis. Mr. J. CLOQUET found the left testicle lying on the psoas and iliac muscles in the body of an old man, with an inguinal hernia of the same side. The size and appearance of the testis and epididymis were quite natural. The upper end of the latter was connected to the sigmoid flexure of the colon, by a strong, short, and rounded fibrous cord†.

The variations, which occur in the descent of the testis, lead to considerable differences in the circumstances under which inguinal herniæ are presented to our notice. The complaint may take place when this organ is still contained in the abdomen. A congenital rupture may exist when it has but just passed the ring; and the gland may then interfere with the measures necessary for returning or keeping up the rupture. A rupture may pass into the scrotum, while the testis is at the ring: or both

* *Works*, vol. ii, p. 162; and vol. iii, *p. 292 and 299.

† *Rech. pathol.* p. 24, note; pl. v; fig. ii.

may descend together*. Lastly, the testis may present occasionally at the opening, when a rupture has formed, and cause unpleasant symptoms from the pressure which it experiences†.

The anatomy of congenital hernia is the same with that of the first species of bubonocoele, in every respect, excepting the circumstance of the testis being contained in the same membranous cavity with the protruded viscera.

The symptoms and treatment of this rupture are the same as those of the complaint in general.

It may be distinguished from common scrotal hernia by the impossibility of feeling the testicle, which part can be clearly felt in those cases. The existence of a rupture from infancy affords also a strong suspicion that it is of this kind. And we have great reason to conclude that a scrotal hernia in a child is congenital, although the case, related in the fourth chapter of this book, shows that the rule does not hold good invariably‡.

* REICHEL *de descensu testiculi in puero, cum hern. incarc. lethali*; in LUDWIG *Advers.* vol. iii, p. 731.

† “I remember,” says RICHTER, “a young man, twenty years of age, who had a small hernia, and no testicle on the left side of the scrotum. The testicle was contained in the abdomen, and sometimes presented at the ring, causing violent pain and symptoms of strangulation, which rendered it necessary to push the gland back again. This object, however, could seldom be accomplished until more than twenty-four hours had elapsed, and emollient cataplasms had been employed. The symptoms immediately ceased when the return of the testis was effected.”

‡ See p. 77.

A congenital epiplocele may be mistaken for a diseased testis; the history of the complaint will lead to the proper discrimination.

Fluid may be collected in the tunica vaginalis while its cavity still communicates with the abdomen; and it may form there during the use of a truss for a congenital hernia. As the contents of the tumour pass into the belly on pressure, such a case may be confounded with hernia. The fluid comes down again into the scrotum, when the pressure is removed, although the patient makes no exertion; and this, together with the fluctuation and transparency of the swelling, are sufficient for the purpose of discrimination. The fluid will generally be absorbed in young subjects.

As there seems to be always a disposition in that membranous canal, which connects the tunica vaginalis to the abdomen, to contract and close, this effect will probably take place in a young subject, if the viscera be replaced, and maintained in their natural situation by means of a proper truss. A radical cure of the complaint will thus be effected in a very short time. The same event cannot be looked for at a more advanced age, where the employment of a truss, as in other species of the complaint, must be regarded merely as a palliative measure.

Before the surgeon applies a truss for an inguinal or scrotal rupture in a young subject, he must not only satisfy himself that the protruded parts are fairly replaced, but that the testicle itself has ar-

rived at its natural situation in the scrotum. A rupture may take place in an infant when this gland has not yet quitted the abdomen. I have already mentioned two cases of scrotal hernia, in which the testis on the affected side had never passed the ring*. Mr. POTT† and HALLER‡ have furnished us with similar instances. The application of a truss to a young subject, thus circumstanced, might prove injurious by retarding the descent of the testis. If it should have arrived only so far as the groin, the pressure of the pad on the gland may be attended with still worse effects.

I have only two or three remarks to make concerning the operation for congenital hernia. The hernial sac should be divided only so far as the upper end of the testis; a sufficient portion of the tunica vaginalis to cover that organ completely being left unopened. The incision must extend lower, if adhesions exist.

The parts are often girded by a contraction of the hernial sac, not only where it communicates with the abdominal cavity, but also in other situations, where we should not have expected this occurrence. Mr. WILMER§ informs us that he has generally found the stricture in these ruptures

* See p. 241.

† *Account of a particular Species of Rupture, &c.* p. 34.

‡ *Opera Minora*, vol. iii, p. 318.

§ *Pract. Obs.* p. 10: and Mr. ALANSON states, that nearly all the cases he has seen of stricture in the neck of the sac have been congenital herniæ. *Ibid.*, p. 96.

to reside in the neck of the sac, and not in the tendon of the external oblique; and Mr. POTT* mentions an instance of remarkable narrowness in the upper part of the sac. In two cases of congenital hernia, recorded by RUDTORFFER, the ring of the external oblique made no pressure, and the stricture was entirely at the mouth of the sac. In one of these he was obliged to prolong the incision of the skin upwards, and even to slit up the tendon of the external oblique, in order to reach the stricture †.

Mr. POTT has seen and recorded many cases where the hernial sac was contracted lower down, so as to embrace the protruded parts with great tightness. The intestine has been so closely girded by this kind of stricture after death, that it could not be withdrawn without laceration: and the omentum, from the same cause, has been converted into a firm hard substance, while above and below the contracted part it still exhibited its natural expansile state ‡. WRISBERG § noticed the same circumstance in a patient whom he examined. There were two contractions of the hernial sac; and the narrowest of these, forming a hard tendinous and callous ring, was in the situation where the tunica vaginalis testis ordinarily terminates just above the testis ||; the other, similar in

* *Works*, vol. iii, p. 299.

† *Abhandlung*, &c. in LANGENBECK, *Biblioth.* i, 983 and 988.

‡ *Works*, vol. ii, p. 161; vol. iii, p. 293, et seq.

§ *Lib. citat.* p. 69 et 70.

|| LE CAT found, on dissection, a complete strangulation

structure and appearance, formed the opening of communication with the abdomen. He ascribes the constriction to the partial accomplishment of the natural process of obliteration. SCARPA* found a contraction in the body of the sac in two congenital herniæ, on which he operated; and PELLETAN† twice saw a narrow round hole, forming the communication between the hernial sac and the tunica vaginalis, and completely filled by the omentum, which had descended into the latter.

CASE.

— HEWER, aged twenty-four, the son of a farmer in Gloucestershire, had been occasionally troubled with a descent of the intestine into the scrotum, since the age of twelve years. Although it appeared afterwards that this rupture was of the congenital kind, it did not take place until the above-mentioned age, and had descended only a very few times.

The parts came down whilst he was riding, on Monday, September 15, 1807, and the symptoms of incarceration very rapidly supervened. The most

through such an aperture. The patient died from this cause; while the free state of the ring, together with the entire absence of pain and tension from the upper part of the tumour, led the surgeon to conclude that the swelling had no connection with the symptoms. *Philos. Trans.* vol. lvii.

* Mem. i, § x.

† *Clinique Chirurg.* tom. iii, pp. 108 and 335.

vigorous methods were resorted to without delay. Large bleeding from the arm and cold applications to the part produced no benefit; and the free use of tobacco, both in the form of smoke and infusion, was equally inefficacious. The latter remedy was employed until its full effect was exerted on the system, as appeared by a considerable reduction in the strength and number of the pulse, cold sweat, pallid countenance, great feeling of anxiety and distress, and a state of faintness approaching to actual syncope. It is by these symptoms, and not by the length of time, nor by the quantity of the remedy consumed, that we can judge whether a fair chance is given to the patient of profiting by the powers of the tobacco.

The operation was performed on the evening of Wednesday, September 17. About half way between the testis and groin, the hernial sac was so contracted, that a probe only would pass into the stricture; and the prolapsed parts experienced, in this situation, as close a constriction as that which they suffered from the margin of the ring. This unexpected circumstance was at first rather embarrassing; for, as the upper division of the sac was first opened, and the communication, in consequence of the closeness of the contraction, could not be immediately discovered, a doubt arose as to the nature of the lower part of the swelling.

When the hernial sac was completely laid open, a fold of intestine was found in contact with the testis, and covered by a portion of omentum. Both

these parts were of a dark reddish brown colour. The stricture, which was formed at the upper opening of the ring, would not admit the smallest portion of the tip of the finger, so that I found it necessary to employ the grooved director and curved knife for its enlargement. The intestine, which was marked by a strong impression from the situation of the stricture, was then returned with ease; and the omentum was cut off on a level with the ring, its divided margin affording no hæmorrhage; the latter part was immediately retracted within the abdomen.

A common clyster was injected, and small quantities of a solution of Epsom salt in mint water were repeatedly exhibited during the night; but no discharge from the bowels took place till the following day, when the patient was much relieved by several copious evacuations. His recovery proceeded in the most favourable way. A single venesection, with fomentations to the abdomen, was sufficient to obviate a slight tendency to inflammation. A very light and sparing diet was rigorously enforced; and no other medical assistance was required, excepting the use of the saline effervescing draughts, with occasional doses of opening medicine. The abdomen continued perfectly soft and free from tension, except just above the wound; here it was rather hard, and pressure excited slight pain, for which leeches were twice applied with benefit.

He was so completely recovered by the 2d of

October, as to bear being removed to his own home, which was several miles distant from the place where the strangulation came on.

As the parts, in a case of congenital hernia, are always protruded on the outside of the epigastric artery, the stricture may be safely divided either towards the ileum, or directly upwards.

SECTION II.

Case, in which the protruded Parts, together with the Sac, are contained in the Tunica Vaginalis.

A PECULIAR species of hernia has been described of late, the appearance of which might considerably perplex an operator, unless he were previously aware of the possibility of the occurrence. In the case, to which I now allude, the protruded viscera, surrounded by their hernial sac, are contained in the tunica vaginalis testis. The rupture, therefore, must be formed when the communication with the peritoneum is closed; but before the contraction has been continued from the abdominal ring downwards. Only two instances of it have been observed; the first was described by Mr. HEY*, and another has been since related in Sir A. COOPER's† work.

* See his "Account of a new species of Scrotal Hernia," in the *Practical Obs.* p. 221 et seq.: first published in Gooch's *Works*, vol. ii, p. 217.

† Pt. i, p. 59.

It would be necessary, in this case, after laying open the tunica vaginalis, to divide the sac, which more immediately invests the protruded parts.

SECTION III.

Congenital Hernia in the Female.

THE distinction of this rupture in the female is of still less practical importance than in the male subject. Indeed, there are no marks by which it could be ascertained; nor would its treatment differ in the least, if that distinction could be made.

NUCK* first pointed out a small production of peritoneum continued through the abdominal ring over the round ligament of the uterus, and terminating by a blind extremity at the groin. He called it a diverticulum; and described it as being about half an inch in length, and by no means constant. The same circumstances have been subsequently observed by others. CAMPER† saw these diverticula in three out of fourteen newly-born children; and LE CAT‡ observed, in a woman of forty-six, a canal of the size of a goose's quill, leading through the ring into a small cavity that would admit the

* *Adenographia Curiosa*, cap. x, “*de peritonæi diverticulis novis*,” fig. 35, 39, 40.

† *Haarlem Transactions*, vol. vi and vii.

‡ *Philos. Transact.* vol. xlvii.

finger. WRISBERG* has particularly investigated the subject. In nineteen out of two hundred female bodies, he found an opening, generally on both sides, but sometimes on one only, leading through the ring into the groin or labium, lined by peritoneum, placed over the round ligament, and terminated by an obtuse extremity. These canals in different instances would admit a probe, a quill, or the finger. Mr. J. CLOQUET, who has made similar observations, represents that the membranous productions in these cases adhere closely to the round ligament; and that they are met with in fœtuses, in young girls, and in women of all ages†.

It has not been ascertained that these diverticula become closed, as the communication between the tunica vaginalis and the abdomen does. Nor does it seem probable that their existence much favours the occurrence of ruptures.

* *De testicular. descensu, &c.* § 34, in his *Commentationes Med. Physiol. &c.* vol. i, p. 234.

† *Recherches Anat.* p. 41.

CHAPTER XIX.

ON VENTRAL RUPTURES.

Their Seat and Symptoms.

THE epithet *ventral* is applied to all those ruptures, which, appearing at the front or sides of the belly, are not protruded through the umbilicus, the abdominal or femoral ring. They come through openings in the abdominal muscles or their aponeuroses; and there is hardly any part of these, at which they may not take place. They are much less common than the species hitherto described. Their most frequent seat is at the interval between the two recti abdominis above the navel: they have been seen in this situation from the size of an olive to that of the fist, or even of a man's head*. The smaller ones occur in the scrobiculus cordis, at the side of the ensiform cartilage, and have been called by the French † *herniæ of the stomach*, from a notion that they contain a portion of that viscus. Although their symptoms are such as denote ordinarily

* RANBY in the *Philosophical Transactions*, 1731, No. 421.

† GARENGEOT, *Mémoire sur plusieurs hernies singulieres*, *Mem. de l'Acad. de Chir.* tom. i, p. 702, et suiv. PIPELET, *Nouvel Observations sur les hernies de la vessie et de l'estomac*, *ibid.* tom. iv, p. 188, et suiv.

stomachic affection, I believe that no part of the stomach has ever been seen in one of these ruptures: the vicinity of the stomach will easily account for the great irritation of that organ. LA PEYRONIE* found a portion of the colon in a small ventral hernia, which had caused, during life, the symptoms ascribed to herniæ of the stomach. LITTRE† found the same intestine in a rupture situated three fingers breadth above the navel. It seems more probable that this bowel should be protruded in such cases, than the stomach. These ruptures are sometimes so small‡ as to occasion no perceptible external tumour; but they may equal the fist in bulk.

Without being strangulated, they cause various symptoms, which are often referred to other sources, and can be cured only by discovering the true nature of the complaint. This will probably be accomplished by observing the inexplicable obstinacy of the symptoms, and attending to the rule of examining carefully all the ordinary seats of herniæ in those affections, in which the stomach and bowels are implicated. The pressure and irritation experienced by the protruded part must be regarded as the cause of the symptoms. The patient feels a pain and dragging at the stomach; and the epigastric

* *Mem. de l'Acad. de Chir.* tom. iv, p. 198.

† *Sur une hernie rare*, in the *Mem. de l'Acad. des Sciences*, 1714.

‡ Arnaud saw one at the side of the ensiform cartilage, not larger than a cherry stone. *Traité des hernies*, tom i. Preface, p. 83.

region is sometimes so sore, that even the pressure of the clothes is painful. Digestion is disturbed; and to such a degree, occasionally, that the lightest food irritates the stomach. Vomiting, hiccough, and nausea are not unfrequent attendants; particularly after taking food. Constipation, lowness of spirits, and considerable debility are often produced. The symptoms are generally worse after eating, and are relieved, or disappear entirely when the patient lies down. The tumour will be more sensible in the erect posture, or when the body is bent forwards; and cannot be distinguished in the recumbent position, in which indeed the parts pass back into the belly. Perhaps the fissure may be felt; and an impulse against the finger will then be distinguished on coughing.

Protrusions through the linea alba are much less frequent below than above the umbilicus.

The linea semilunaris*, the hypochondria† the

* LE DRAN, *Traité des Operations*, p. 143; KLINKOSCH, *Programma, quo divisionem herniarum, novamque herniæ ventralis speciem proponit*; Prag. 1764. Also in SANDIFORT'S *Thesaurus diss.* tom. ii; and in the *Dissertationes Pragenses*, vol. i, Sir A. COOPER has seen three instances of it; and the tumour was below the level of the umbilicus in all. *On Crural and Umbilical Hernia*, p. 58.

† LA CHAUSSE *de hernia ventrali*, § 12, Argentorati, 1746; also in HALLER *diss. Chirurg.* tom. iii, see § xii; GUNZ *de herniis*, p. 91; HEISTER *diss. de hernia incarcerata, suppurata*, &c. § 5; in HALLER'S *diss. chir.* tom. iii; SOEMMERRING *uber die Ursache, &c. der Brüche am Bauche und Becken*, p. 31: a ventral hernia in the right hypochondrium, about the level of the navel, from lifting heavy burdens; LODER'S *Journal*, vol. iii, p. 447. In a

sides of the belly between the ilia and the last ribs*, and the lumbar region†, may be the seats of ventral ruptures; but such cases are rare.

The most circumstantial description that we possess of hernia, consequent on a severe injury, described by Mr. Cloquet, the tumour, about the size of a nut, was situated between the eighth and ninth ribs, at the junction of the cartilage and bone. It sometimes increased to the size of an egg, with all the symptoms of strangulation. It was excessively painful, and could not be reduced; nor could pressure or bandage of any kind be borne. *De l'Influence des Efforts sur les organes renfermés dans la cavité thorachique*; p. 63.

* PETIT *Tr. des mal. Chir.* tom. iv, p. 225. The tumour was as large as a child's head; and usually went back in the recumbent posture. LA CHAUSSE, lib. cit. § 12.

† RAVATON *traité des plaies d'armes à feu*; obs. 60. Of the case related in the *Philosophical Transactions*, No. 410, art. ii, by Mr. J. Budgen, and supposed to be a hernia of the urinary bladder at the loins, the particulars there stated are not sufficient to determine the nature; and they certainly do not authorize us in concluding either that it was hernia, or that the tumour contained the urinary bladder.

A girl was born with an indolent tumour, of the colour of the skin and size of a pigeon's egg, near the lower vertebræ. At the age of ten years it had acquired the size of a calf's bladder, and in seven years more that of a cow's. At this time it broke and discharged much fluid, "instar urinæ." "Re perspecta, invenimus tunieas (et interius materiam mucosam) ureteres, venas et arterias, tales omnino, quales vesica habere consuevit; nec defuit commercium quoddam eum partibus internis per foramen in vertebris digitum hominis minorem in abdomen admittens, quod vasa memorata recipiebat." She died in four days, and if the parents had allowed an examination after death the narrator has no doubt that the tumour would have been found to consist of the bladder; for the girl had not made any water since the swelling burst.

sess of a lumbar hernia is given by Mr. JULES CLOQUET, in his valuable *Recherches sur les causes et l'anatomie des hernies abdominales*. This rupture, caused by a sudden effort in a man 75 years old, was characterised by a rounded slightly prominent tumour on the right side of the lumbar region, an inch and a half below the last rib, and five fingers breadth from the spinous processes. It was enlarged and rendered tense, so as to communicate an impulse to the hand on coughing or other efforts; and it was attended with pain in the part, colic, nausea, and constipation. When the patient was placed on his belly, pressure removed the swelling, a hollow was left in its place, and he felt relieved. The return of the prolapsus was prevented by a pad, fastened in its place by an elastic belt, buckled over the part; this permanently removed all uneasiness. The tumour, however, would reappear when this apparatus was laid aside*.

The opening, through which the parts are protruded, is usually considerable in ventral hernia, more particularly in such as do not happen in the linea alba. Hence the tumour is broad and flat; the basis being the largest part; hence also it generally disappears, or is very easily reduced, in the recumbent posture; and is very seldom strangulated.

Causes.

SINCE there are no natural openings in the abdominal parietes, in those situations where ventral

* P. 4 and 5 ; note.

ruptures occur, it appears difficult at first to account for their formation. Small blood vessels and nerves come through the muscles to the integuments, and it has been conceived that the opening, for transmitting these, when larger than usual, may favour the occurrence of herniæ: but this explanation is at best very doubtful. Such apertures are not noticed in the linea alba, where ventral herniæ usually occur: and, although they are numerous in the aponeurosis of the obliquus externus, they are completely shut up towards the abdomen by the muscles situated behind that aponeurosis.

Sometimes there seems to be a natural weakness in the construction of the linea alba, favouring the occurrence of ruptures. Sir A. COOPER* saw three ruptures in this line in a child. GUNZ† and WRISBERG‡ found them in young subjects, in conjunction with exomphali. A more general deficiency of the same kind has been observed, producing a fissure of two fingers breadth from the chest to the pubes, at which the bowels were easily protruded and replaced §.

These ruptures sometimes take place suddenly, from a considerable bodily exertion, and with a sense

* *On Crural and Umbilical Hernia*, p. 58.

† *De Herniis*, p. 72. In a boy of eighteen weeks.

‡ RUDOLPHI, *Diss. de peritonæi diverticulis; iisque imprimis, quæ per umbilicum et lineam albam contingunt*. Obs. 1. In a girl of five years.

§ *The New London Medical Journal*, 1792, vol. i. In a child of two years.

of laceration, or of something giving way. It is certain that the abdominal muscles are strongly contracted on such occasions, and we can conceive that some part may be actually torn, so as to give rise to the rupture. A case, which I lately examined, clearly proves that such lacerations do occur. A woman, who had been admitted into St. Bartholomew's Hospital in December, 1809, for a strain, caused by lifting a heavy table, died there from an attack of inflammation in the chest. She had complained merely of pain in the loins on her admission. Both the recti abdominis muscles were lacerated through about one third of their thickness; and there was a small quantity of coagulated blood about the torn fibres. The sheath was not ruptured*.

Penetrating wounds of the abdomen are often followed by ruptures. A case of this kind is related in chap. ii, at p. 40; and, in an instance observed by Mr. WARDROP†, where a piece of wood had penetrated the cavity half way between the spinous process of the ilium and the pubes, an enterocele of six inches in length by four in breadth, with very thin coverings, and easily reducible, took place. Two years ago I attended, with Mr. HOLT of Tottenham, a boy about twelve years old, with a considerable wound of the abdomen, not followed by hernia. It was inflicted by the tusk of a boar; and

* There is a case in the Parisian Journal, in which the peritoneum and abdominal muscles were torn across for the space of three inches by a fall from a considerable height, vol. i, p. 366

† COOPER, pt. ii, p. 60.

I found the greater part of the stomach, distended by a hearty dinner recently taken, the omentum, the transverse arch of the colon, and some convolutions of small intestine, protruded, and lying naked on the belly. When the parts had been returned, which was not accomplished very easily, or quickly, they could only be kept in by a close and firm uninterrupted suture. Copious bleeding, purging, and starvation, were the means by which the patient recovered from this very formidable injury. No protrusion has occurred in this case.

It has been asserted, that abscesses in the muscles are followed by ventral ruptures*: blows, too, seem to have produced them in some instances. They could hardly occur in the situation of the recti, or where the abdomen is covered by the three broad muscles at the side, without some previous injury to the parts, as from a wound.

The distention of the belly in pregnancy† is fa-

* “A l’égard des abcès, pour qu’après leur guérison ils laissent une disposition à la hernie, il faut que la matière qui les forme, se trouve logée entre le péritoine et les muscles. J’ai vu deux fois ce cas, et l’un et l’autre à la suite des grossesses.” PETIT, lib. cit. p. 259.

See also the reference in the note, p. 40.

† SCARPA observes, that the superior portion of the linea alba yields more than the inferior to the impulse of the uterus and abdominal viscera; and that if we examine carefully, in those who have had many children, the superior portion of the aponeurosis, and place it opposite to the light, it is found to be irregular, thin in some places, and transparent, in others wasted, and disposed to separate longitudinally or transversely. M. 5, § 10.

avourable to the occurrence of ventral herniæ ; and particularly to that description, in which the parietes yield through a large extent.

Anatomy.

THE peritoneal sac of a ventral hernia is covered by an exterior investment produced by the condensation of the surrounding substance : and this is again covered by the integuments. Those, which follow wounds or abscesses, are said to have no sac ; because, as it is alleged, the divided peritoneum does not unite again. I believe that this point has not been proved by any well-authenticated facts.

The sides of the aperture are tendinous when the rupture occurs in the linea alba ; but they will differ in this respect according to the situation of the protrusion.

Treatment.

THE symptoms and the treatment of ventral hernia in general, are the same as those of ruptures in other situations ; and the usual precautions of avoiding costiveness, great exertion, and any species of clothing that presses tightly on the lower part of the chest, or on the abdomen, are as necessary in these as in other herniæ.

Bandages.

THE observations, which have been made on the bandages for umbilical herniæ, will apply for the most part to the ventral species also. A small rupture of the latter kind, such, for example, as occur in the upper part of the linea alba, may be very conveniently kept up by an ordinary inguinal truss, slightly modified, if it should be necessary, according to the circumstances of the case. By such simple treatment patients have been relieved from very distressing symptoms, and sometimes recovered from a condition of considerable apparent danger*. When the tumours are more considerable, the truss devised by Mr. EAGLAND, and described in the chapter on umbilical hernia, p. 483, is the best. Sometimes a broad laced corset of leather, or other stout material, with a suitable compress, has been found the most easy way of managing the tumour†.

* “ J’ai plusieurs fois vu des malades attaqués depuis longtems de nausées, d’envies de vomir, de coliques et de constipations, auxquels on administroit des medicamens de toute espece sans aucun succès, et qui ont été guéris, comme par enchantement, par l’application d’un bandage qui retenoit une hernie ventrale a peine sensible.”—SABATIER, *de la Medecine opératoire*; tom. i, p. 176.

† “ Il n’y a pas longtems que j’ai été consulté avec plusieurs de mes confrères, pour une hernie de cette espèce, qui étoit au-dessus du nombril. Lorsqu’on posoit le doigt sur l’écartement des muscles, et que le malade faisoit effort pour lever la tête de dessus l’oreiller, ce doigt se trouvoit serré et embrassé sur les

Strangulated Ventral Hernia.

IN consequence of the large opening, by which the viscera pass out of the abdomen, I have already observed, that ventral ruptures seldom become strangulated. Very few instances of such an occurrence are recorded. LITTRE* mentions a fatal strangulation of the colon in a small ventral hernia of the linea alba; PETIT† saw a hernia between the last rib and the pelvis in a state of incarceration; and Sir A. COOPER‡ mentions an unsuccessful operation in a protrusion at the linea semilunaris.

We should, therefore, place more reliance on purgatives and clysters, and persevere longer in employing them in a strangulated ventral rupture, than in the more common kinds of the complaint. There is no difficulty in the operation, should that be required; nor are any particular directions or pre-

côtés. Il y avoit de vomissemens frequens et douloureux, qu'on ne pouvoit attribuer a aucune autre cause, puisque le jeune malade se portoit bien d'ailleurs. Nous conseillâmes un corset, qui se laçât par derriere, pour rapprocher les muscles, et qui portât anterieurement une pelotte platte et large pour soutenir la ligne blanche. Une autre fois j'ai vu une tumeur herniaire de forme alongée, dont la grosseur égaloit celle d'un pain de demi-livre. Le malade avoit sept à huit ans comme le premier. Mes conseils avoient été à peu près les mêmes." — SABATIER, lib. cit. p. 178.

* *Mem. de l'Acad. des Sciences*, 1714.

† *Traité des Mal. Chir*, ed. ii, p. 225.

‡ *On Crural and Umbilical Hernia*, p. 60.

cautions necessary. There cannot be any vessels of importance near the mouth of the sac. If the tumour exceed a moderate size, it would be advisable to operate without opening the sac.

Distention of the Abdominal Parietes.

THERE is another form of complaint, which, as the viscera are not protruded from the cavity, does not come properly under the denomination of a rupture: but its causes, nature, and treatment are so closely analogous to those of ruptures, as to justify the arrangement by which the two subjects are brought together. The muscular and tendinous parietes of the abdomen, being weakened, yield altogether, and are distended so as to form a large tumour. RICHTER* saw a broad swelling, equal in size to a woman's breast, in each groin of the same individual: the case seems to have been of the description just mentioned.

But the linea alba is the most frequent seat of the affection, and its dilatations may vary considerably in degree, including only a small part of this line, or its whole length. In a woman of weak

* *Traité des Hernies*. p. 8. There are two examples of the same kind of hernia in HENCKEL, *Chirurgische Operationen*, tom. iv, p. 67 and 76; an analogous instance is recorded by SIEBOLD in LODER's *Journal*, 1797, vol. i, p. 215. The tumour, equal to a loaf of bread in size, was situated between the cartilages of the ribs and the umbilicus.

constitution, after several difficult labours, SOEM-MERRING* saw the linea alba give way above the navel. MOHRENHEIM† observed a general yielding of the whole tendinous line, from the ensiform cartilage to the pubes, after a bad labour. It formed an oval tumour when the trunk was inclined forwards; a narrower and more elongated prominence, when the person was erect.

The tumour, in these cases, will necessarily have an elongated figure; and the margins of the opening are formed by the recti muscles. The distention of the abdominal muscles in pregnancy particularly disposes to this affection, which seems almost confined to the female sex. If the interval between the recti is naturally broad, and the linea alba weak, this kind of rupture will more easily occur. There is no fear of strangulation, since the base of the tumour is the broadest part; and the opening in all cases is very free.

These dilatations of the abdominal coverings have sometimes proceeded to an enormous extent, so as really to deserve the name, applied to them by the French‡, of *éventrations*. RUYSCH saw the gravid uterus contained in a large bag formed by the

* *Ueber die Ursache der Brüche am Bauche und Becken*, p. 27.

† *Beobachtungen verschiedener chirurgischer Vorfälle*, 1783, vol. ii; a corresponding case is related in the *Acta Physico-Med.* vol. ii, obs. xciv.

‡ PETIT, lib. cit. p. 224 and 237, 2d edit.; SABATIER, *de la Med. Operat.* tom. i, p. 178.

yielding of the abdominal coverings, and hanging down to the knees: and a similar case is mentioned by LORRY*.

An observation recorded by PETIT†, shows us to what extent these dilatations may proceed, and should inculcate the necessity of an attention to them in their commencement. An infant, in whom a weakness of the linea alba was observed, wore for a long time a corset that laced in front, and supported the whole abdomen. This was left off at the age of four or five years; and she grew up without experiencing any inconvenience. She was seen by PETIT in the sixth month of her first pregnancy; at which time there was an enormous tumour, containing the gravid uterus, besides intestines and omentum, and formed by the yielding of the linea alba. She had experienced occasional attacks of colic and vomiting; which had become more and more violent and frequent. GARENGEOT saw a case of this kind, in which the tumour hung half way down the thighs; and LA PEYRONIE communicated to the French Academy of Surgery two instances of the same description‡.

The support of broad and firm bands, laced or buckled before or behind, with the addition of com-

* *Journal de Medecine*, tom. lxi, p. 274.

† *Lib. cit.* p. 237.

‡ *Mem. de l'Acad.* tom. i, p. 701.

presses, according to circumstances, is necessary in these cases.

Fatty Tumours on the Linea Alba, resembling Ruptures.

WE sometimes observe small collections of fat, from the size of a nut to that of an egg, connected by pedicles, which pass through slits in the linea alba to the peritoneum: they have been called by the French * *hernies graisseuses*. They may be mistaken for omental ruptures, especially if they admit of being more or less completely returned; and the mistake would be more likely to occur if there were any intestinal disorder, that might, with probability, be referred to a rupture as its cause †. Hence we find that such tumours have been even operated on as herniæ. In a case, where this happened at the Hotel Dieu, the tumour, situated above the navel, was a mass of yellow fat ‡.

* PELLETAN, *Clinique Chirurg.* tom. iii, p. 33, et suiv.

Mr. BIGOT has published a thesis on the subject; *Diss. sur les tumeurs graisseuses exterieures au p ritoine, qui peuvent simuler les hernies*, Paris, 1821.

† MORGAGNI relates the case of a patient affected with intestinal disorder, who had a tumour of this kind above the navel. Examination after death proved that it consisted of mere fat. *Epist.* xliii, art. x.

‡ PELLETAN, *lib. cit.* p. 40, note 1.

Another instance is mentioned by Mr. TARTRA; *Journal g n ral de M d. Chir. et Pharm.* an 1805; and Mr. OLLIVIER, the

SCARPA* has related, with great candour, an instance of the same description which occurred to himself. A woman was seized with colic, accompanied with painful tension of the abdomen, nausea, and suppression of stools. A tumour was found between the umbilicus, on the left side of the linea alba, of the size of a large nut. Its contents, as disclosed by the operation, were a small mass of hard fat, continued into a pedicle, which evidently passed through the linea alba, and was removed by a stroke of the knife.

The author last quoted saw two in the dead body of a man fifty years of age: one immediately below the ensiform cartilage, the other a little above the navel. The first was of the size of a small nut; the other of a pigeon's egg. Both consisted of firm adipous substance, continued into a flattened pedicle, which passed through the linea alba†. PELLE-TAN‡ has seen five or more in one individual; chiefly in the course of the linea alba. Mr. FAR-DEAU§ met with three in the body of a man which he dissected; one just below the ensiform cartilage, a second two inches above the navel, and a third at

translator of the *Supplément au traité prat. des Hernies*, par A. SCARPA, has recorded a similar example at much length; p. 109, note.

* Mem. v, § xiii.

† Loc. cit.

‡ Lib. cit. p. 38.

§ *Observation sur trois hernies graisseuses sur le meme individu*, in the *Journal Gen. de Med. &c. ou recueil publié par la Soc. de Med. par SEDILLOT*, tom. xviii, p. 268.

the outer side of the spermatic cord. The first was about the size of a nut; the second of an egg; and the third of a testicle.

I have frequently seen these small tumours in dissection, and have always found them to consist of mere fat.

In the observations on the diagnosis of inguinal ruptures, the occurrence of similar masses of fat in the spermatic cord has been mentioned. See p. 225.

CHAPTER XX.

HERNIA OF THE BLADDER, OR CYSTOCELE.

THIS kind of rupture takes place most frequently through the abdominal ring: it has been observed also at the crural ring, in the perineum, and the vagina. When we consider that the fundus of the urinary bladder, in the natural state, rises above the pubes only when the cavity is considerably distended, and that its anterior surface is connected by cellular membrane to the surrounding parts, it seems difficult to account for the protrusion of the organ; and the occurrence is indeed rare: but the examples are so well authenticated as to remove all suspicion as to the fact. Experience has shown, not merely that the bladder may be protruded at the abdominal ring, but that it may descend even to the bottom of the scrotum. Cases, too, are recorded, in which this organ is said to have been contained in an inguinal and vaginal rupture of the same subject*, and in a bubonocoele on both sides of the body †.

* See the excellent memoir of Mr. VERDIER, entitled *Recherches sur la hernie de la vessie*, in the *Mem. de l'Acad. de Chirurg.* tom. ii, p. 22.

† LEVRET, *obs. sur les polypes*; p. 145: quoted in RICHTER, *Tr. des Hern.* chap. xlii.

It is necessary to the occurrence of a cystocele, that the bladder should be placed immediately behind, or very close to the ring; and that it should hold that situation when empty: for the distended condition of the organ is obviously so very unfavourable to a protrusion, that it can hardly be deemed possible in that state. Repeated distensions of the bag, from any cause, must therefore be regarded as particularly disposing to this kind of rupture: and the lateral extension of the viscus in pregnancy facilitates its occurrence. We often discover the bladder, on dissection, adhering in such cases to the back surface of the abdominal muscles, instead of having its fundus behind the pubes. These causes, however, exist in abundant instances, without giving rise to herniæ of the bladder; and the latter complaints cannot, in many cases, be traced to any causes of the nature now alluded to.

If the bladder, either from being naturally large, or from having its capacity increased in consequence of retention of urine, is placed behind the ring, when undistended it may be propelled through the opening just as easily as any other of the abdominal contents. In this case, a portion of the anterior surface is first protruded; and, as this is connected by cellular substance to the surrounding parts, without possessing a peritoneal covering, the rupture in this stage possesses no hernial sac. When we observe the fundus of the bladder, in retentions of urine, rising to the umbilicus, or higher, notwith-

standing the cellular adhesions which unite it to the pubes, we shall conclude that these connections will not prevent the rupture from increasing under the continued action of the same causes, which first produced it. The neighbouring part of the fundus, or side of the bladder, where it is covered by peritoneum, is gradually drawn through the ring, and forms a kind of hernial sac, which has a very different relation to the protruded part of the bladder, from that which the peritoneal covering bears to the contents of an ordinary rupture. It forms a membranous cavity, ending below in a cul-de-sac, opening above into the abdomen, and lying in front of the bladder, to the anterior surface of which its posterior half closely adheres. The omentum or intestines may easily descend into this pouch; and thus an omental or intestinal rupture will be super-added to the hernia of the bladder. It has not been ascertained whether these protrusions occur in the course of the abdominal canal, or come directly through the opening in the aponeurosis of the obliquus externus. If the situation of the upper opening be compared with that of the bladder, it would seem very difficult for a cystocele to take place at that aperture; while its occurrence at the lower opening can be very readily conceived. It was noticed in one case that the spermatic vessels were on the exterior side of the hernia*. When the pro-

* KEATE's *Cases of Hydrocele, &c., to which is subjoined a singular Case of Hernia vesicæ urinariæ, &c.*, 8vo. London, — 1778.

truded part descends into the scrotum, it will probably lie in front of the spermatic cord; even although the latter part should have been placed exteriorly to the swelling at the ring.

As a cystocele may give rise, in the manner already described, to a protrusion of intestine or omentum, so an enterocele or epiplocele may cause a descent of the bladder. The symptoms of the latter occurrence have not been observed in many instances until long after the patients had been incommoded by an intestinal or omental hernia; and it has even been suggested that the former is always preceded by the latter complaint. But this is contrary to experience, which has shown us that a protrusion of the bladder may exist alone.

The manner in which an ordinary omental or intestinal rupture may become complicated by the addition of a cystocele, can be easily understood, when we consider that the peritoneum forming the sac was placed immediately behind the ring, and is continued over the fundus of the bladder. If the original hernia be neglected, its increase elongates the hernial sac, gradually drawing into the ring that portion of the peritoneum, which is attached to the bladder, and the bladder itself, if it be disposed to yield to this force. Thus a portion of this organ becomes situated behind the cavity of the first rupture; and it passes through the ring just as the fixed portions of the large intestine do in the gradual increase of a common scrotal rupture. See chap ix, sect. vi.

The anatomical description is the same in this as in the preceding case. The protruded portion of the bladder is here interposed between the original hernia and the spermatic cord. The posterior surface of the sac, at its upper part at least, consists of the peritoneum covering the fundus and back of the bladder: and the proportion of the bag formed in this way depends on the extent of the protrusion.

A bubonocoele taking place through the abdominal canal gradually brings the upper opening behind the lower one, so that we can conceive the possibility of the bladder being drawn through the ring in the subsequent increase of the swelling. But the relative positions of the opening, and the bladder, render the occurrence of cystocele more probable as a consequence of the internal inguinal rupture. These points have not yet been determined by actual observation.

It will be obvious from the preceding account, that the urinary bladder must be very differently circumstanced, in respect to its covering of peritoneum, from the more ordinary contents of hernial swellings. When the anterior part of the viscus is protruded, without the fundus being drawn into the ring, it will be everywhere adherent by cellular substance, and possess no sac at all. This was the case in an instance recorded by Mr. POTT*, where, however, the bladder had descended to the

* See the "*observations on ruptures*," in the third volume of his works; case xxiii.

bottom of the scrotum. When the fundus or side has been protruded, the posterior part only of the swelling adheres to the surrounding parts, and there is a bag formed by the peritoneum in front. The cellular adhesions in both cases are such as to render the return of the protrusion impossible. Although the natural connections might be expected to oppose any considerable displacement of this bag, we find that a very large portion of it may quit the abdomen, descending to the bottom of the scrotum, and forming, when full of urine, a very considerable tumour*. The part undergoes further changes after it has passed through the ring. It becomes contracted in the opening, and expands again below. Mr. KEATE "found it contracted at the ring, dilating itself again in the abdomen and pelvis, and forming a kind of double bag, divided by the ring†." And the same change had occurred to a still greater extent in an instance operated on by Mr. POTT.

* In the case already quoted from Mr. KEATE, the greatest part of the bladder was in the scrotum; and many instances, where the tumour was considerable, are recorded. See MERY, *Observations sur différentes Maladies*, in the *Acad. Roy. des Sciences*, an 1713; RUYSCH, *Observat. anatomico-chirurg. Centuria*; Obs. xcvi; VERDIER, in the *Acad. de Chir.* tom. ii, pp. 15, 20; POTT's *Works*, vol. iii, p. 323.

† P. xli. BERTRANDI mentions an analogous case, in which there seems to have been also some formation of stone. "Vidi porro ego herniam vesicæ urinariæ, cujus transitus per anulum musculorum abdominis ita fuerat coarctatus et obstructus, ut non nisi perfracto tartareo quodam cæmento tenuem stilum trajicere possemus." *Mem. de l'Acad. de Chir.* tom. iii, p. 103.

He discovered a membranous bag, growing narrower as it proceeded upwards; and a membranous duct, about the size of a large wheatstraw, was continued from its upper end through the ring. The urine flowing through this, when it was divided, proved the case to be a hernia of the bladder*. Stones have been contained in the protruded portion in many instances†.

The symptoms of cystocele will be different according as the protruded portion is full or empty; confined to the groin or continued into the scrotum; and simple, or combined with intestinal or omental rupture. When the part is empty, its volume is not considerable, the sides collapse, and examination discovers nothing but a soft membranous substance rolling under the fingers. But the most characteristic circumstances arise from the state of the urinary evacuation. When there is a frequent desire to expel the urine, with occasional retention; when the tumour increases after retaining the water for some time, and is diminished, or entirely disappears on voiding the urine, the case must be a cystocele. The patient sometimes feels unable to expel the urine, without elevating and compressing the tumour; but he can accomplish it easily by that means. After voiding all that he can, a further

* *Works*, vol. iii, p. 327.

† BARTHOLINI, *Hist. Anat.* cent. iv, hist. 28. *Acad. de Chir.* tom. ii, pp. 10, 13, 15. In the first of these cases there were four stones. POTT, vol. iii, p. 327.

desire to make water is excited by pressing the swelling. When the bladder has descended into the scrotum, and is full of urine, it might be mistaken for hydrocele. The dysury, the power of diminishing the swelling by pressure, and the desire of making water consequent on this, sufficiently distinguish the case. To the peculiar symptoms of cystocele will be added those of an intestinal or omental rupture, when the affection is complicated. In some cases the protrusion of the bladder has been attended with no symptoms. Its existence was not known until after death in Mr. KEATE's case, where the greatest part of the viscus had passed into the scrotum: and the same observation may be made concerning a case related by ARNAUD*.

Surgical treatment can avail very little in herniæ of the bladder. The part cannot be replaced, and we must therefore be contented to support and press on the tumour by means of a suspensory bandage. If its existence were discovered in an early stage, perhaps it might be reduced by the constant pressure of a truss with a hollow pad. It seems to be hardly susceptible of strangulation. If a stone were discovered in it, we ought to remove it by an incision. No ill consequence followed in two instances, where openings were made in the protruded portion of the bladder†.

* *Mem de Chir.* p. 78.

† *Acad. de Chir.* tom. ii, pp. 11, 13.

Hernia of the bladder, under the crural arch, is very rare: one case is mentioned in the memoir of VERDIER*.

The protrusion of the organ in a perineal or vaginal rupture will be indicated by the peculiar symptoms connected with the urinary evacuation. Its treatment does not differ from that of other ruptures in the same situations.

* P. 23.

CHAPTER XXI.

PERINEAL RUPTURE.

HERNIÆ may take place at the lower aperture of the pelvis. The parts descend at the side of the rectum, passing between the fasciculi of the levator ani*, or distending the fibres of that muscle, and form a tumour at the side of the anus.

In the female, protrusions may occur in the vagina; or, passing along the sides of that canal, may present in the labium: these, which are called vaginal and pudendal herniæ, will be considered in the next chapter.

The greater capacity of the female pelvis in all dimensions will explain easily the greater frequency of ruptures at its lower aperture in that sex.

As the rectum touches the vagina in the female, and the bladder in men, by its superior surface, the bowels will escape rather by the side of

* The situation in which the protrusion occurs may be seen in CAMPER, *Demonstrat. anat. pathol.* lib. ii, tab. ii, fig. i.

The supplement to the work of SCARPA contains the best illustration of the subject, in a memoir on hernia of the perineum, and five plates, which exhibit both the external appearance and the anatomy of the tumour in a case which the author attended and dissected. *Supplément au traité prat.* p. 118; pl. xv — xix.

these viscera, than in the middle of the perineum.

There is a considerable distance between the reflection of the peritoneum from the rectum to the side of the pelvis, the vagina or bladder, and the surface of the body; hence we can conceive that an imperfect protrusion may take place without forming an exterior swelling. Such an occurrence can be discovered by dissection only; and we cannot recognise the perineal hernia until a tumour appears externally.

The contents of these ruptures have been some portion of the intestinal canal, or, as it is stated, of the urinary bladder.

The swelling possesses the ordinary characters of a rupture. It becomes larger and more tense in the erect position, or when the patient holds his breath; smaller and softer when he lies down; and disappears entirely on pressure. It occasions various intestinal affections. From its immediate vicinity to the neck of the bladder, it will be likely to press upon and irritate that viscus; and the swelling, which it forms, must be perceptible from the rectum. When the bladder is protruded, the peculiar symptoms mentioned in the last chapter will point out the nature of the case.

The treatment consists in replacing the parts, which may perhaps be facilitated by introducing the finger into the rectum or vagina, and preventing them from descending again by means of external pressure. This may be applied by means of the T

bandage; of which the portion passing between the thighs is furnished with a suitable compress, either of ivory, or of softer materials, adapted in shape to the part. If this should be insufficient, we may employ the instrument described in the case quoted below from SCARPA. The introduction of a pessary into the vagina, by keeping that cavity distended may assist in preventing protrusion in the female subject.

SMELLIE has an instance, which will be mentioned below, of incarcerated perineal hernia. It would be the duty of the surgeon, if he met with such a case, to attempt relief by an operation.

The first observation of a perineal enterocele is ascribed by SABATIER to Mr. CHARDENON, a surgeon of Dijon. In examining the body of a man, who had died of an acute disease, he noticed the ileum descending into the middle of the pelvis between the rectum and bladder. The intestine gave way suddenly as he was endeavouring to draw it up, and a hernial sac, of the size of a pigeon's egg, came into view. It had a contracted entrance, with a hard and callous edge. By introducing a finger into the cavity, it could be distinctly ascertained that the sac was covered only by integuments; and when this was distended with lint, a tumour was observed in the perineum*.

* This account of the case is given in RICHTER, chap. xli, from LE BLANC'S *Précis d'Opérations*, Paris, 1775, t. ii, p. 244. The case is also quoted at full length in SCARPA, *Supplément*, p. 134.

The existence of this rupture was also ascertained after death in a male subject, brought for dissection to the anatomical school at St. Thomas's hospital. The peritoneum formed a bag of an elongated shape between the rectum and the under surface of the bladder and prostate. But its lower extremity did not reach the skin, so as to form any tumour. The mouth of the sac was two inches and a half from the anus. The case is represented in SIR A. COOPER'S work *.

The case of Carlo Capella, related by SCARPA †, is the most accurate and satisfactory account, that we hitherto possess, of the perineal hernia. In consequence of an exertion made with the legs apart and the body bent forwards, a tumour suddenly formed at the right side of the anus, as large as a small nut, and receding on pressure. During a severe cold, which came on soon after, this tumour acquired the size of a pigeon's egg; and further efforts at a subsequent time made it very painful, with a benumbed sensation in the whole extremity. SCARPA, who saw him some years after the commencement of the affection, found a pyriform tumour near the margin of the anus, as large as a hen's egg, with the basis resting on the edge of the gluetus

* Pt ii, p. 67; and pl. xi, fig. iii. BROMFIELD, in his *Surgical Observations*, vol. ii, p. 264, relates the case of a boy, in whom the small intestines protruded through the wound during the operation of lithotomy. This has been deemed an instance of perineal hernia, but it appears rather doubtful.

† *Supplément*, p. 121.

maximus, and easily reducible. He kept it reduced by means of a truss, consisting of a circular steel spring surrounding the pelvis and fastened in front, and of a segment of a circle continued from the back part of the former at right angles, curved a little forwards at its end, which was furnished with an oval pad, calculated to press on the tumour. The intestine, in one instance, became strangulated; but relief was soon obtained by fomentations and clysters. He died of a pulmonary affection. The ilium passed into a hernial sac, of which the orifice, nearly an inch in diameter and round, was situated at the right side of the rectum and bladder, and it was protruded in the interval between the right side of the anus, the tuberosity of the ischium, and the point of the coccyx. After removing the skin, a thin stratum of the fibres of the levator ani, separated from each other, was found to cover the hernial tumour; and, on turning this aside, the hernial sac was exposed. Its mouth was not within the pelvis, but lower, exactly in the perineum; thus it appears that this part is originally higher, and within the pelvis, but that it gradually descends. In its several dimensions, which were carefully measured, this pelvis equalled that of the female.

SMELLIE has two examples of perineal rupture in his *Collection of Cases and Observations in Midwifery*. In the first of these there was a swelling at the left side of the anus, which had formed gradually; disappearing in the recumbent, and coming down again in the erect posture. Labour-pains

came on while the hernia was down, and considerable inflammation with strangulation ensued; the delivery was followed by a large discharge of blood; discutient fomentations and cataplasms were ordered to the part, and the swelling was reduced soon after. It appeared again in the following labour, when SMELLIE introduced his hand into the vagina and pushed it up, the child's head immediately descending into the pelvis *. In the second case, a swelling appeared at the left side of the perineum and anus, about a month after delivery. It increased considerably, protruding at first only when the patient was in the erect posture; and she could reduce it by introducing two fingers into the vagina. She became pregnant, and was seized with a violent cough, which enlarged the swelling to the size of a fist, and rendered reduction very difficult. Great pain was experienced in the parts as she increased in bulk, and about five weeks before labour the swelling became quite irreducible. After this had continued for some days, SMELLIE found her in great agony, with the surface of the tumour livid. It burst, and gave issue to a spoonful of pus mixed with blood, and afterwards to half a pint of a greyish blue fluid. She was immediately relieved, and exclaimed that the intestine had gone up. Although the fluid, supposed by her attendants to come from the intestines, still continued to escape, she recovered quickly, went her full time, and was delivered without any unpleasant occurrence. A

* Case iv, p. 144.

little fluid still oozed from a small orifice some months after delivery; she continued subject to occasional violent pain and constipation; the rupture appeared again, in consequence of an effort, but it was reducible *.

Perhaps the two cases, quoted in the first note to chap. xxiv, ought to be regarded as examples of perineal herniæ. *

MERY saw a tumour larger than a hen's egg, between the os externum and the anus, in a woman about five or six months gone with child. She experienced difficulty and pain in making water; but, when he pressed the tumour it disappeared, and urine was voided †.

Another example is recorded by VERDIER ‡. A lady, in the sixth month of pregnancy, consulted a surgeon for a difficulty in making water. There was a tumour on one side of the perineum. A fluctuation could be perceived in this; it disappeared on pressure, and came down again when the compression was discontinued. When considerable force was used, a small quantity of urine escaped through the urethra. The swelling went away after parturition, and came on again at the end of the second pregnancy. It was now considerably larger, and occupied the whole perineum. It was treated with compresses and bandage.

* Case v, p. 145.

† *Mem. de l'Acad. des Sciences*, année 1713; p. 111, obs. ii.

‡ See his Memoir already quoted, p. 25.

PIPELET* relates a case, which he conceives to have been a protrusion of the urinary bladder at the perineum of the male subject. A considerable exertion in leaping was followed by a very severe pain in the perineum; and the patient constantly felt after this time an uneasiness, with a sense of weight in the part. But he complained chiefly of being able to make only a small quantity of water at a time; and of being obliged to press on the swelling, in order to facilitate the process. This pressure, however, procured a more abundant discharge of urine. The swelling was oblong and soft, and equal in size to a hen's egg. It could be easily reduced. Compresses and a bandage kept it up.

* *Mem. de l'Acad. de Chirurgie*, tom. iv, p. 182.

CHAPTER XXII.

VAGINAL RUPTURE.

THE tumour, in this case, is contained in the cavity of the vagina, and its external surface is formed by the membrane of that canal. The peritoneum is continued from the back of the bladder to the front of the uterus, without covering any portion of the vagina. When the membranous cul de sac formed between the two organs is pushed downwards, a swelling takes place at the upper and back part of the vagina. From the rectum the peritoneum is continued to the inferior surface of the vagina, of which the posterior half is covered by that membrane. A protrusion in this situation must form a swelling at the lower and middle part of the canal. The immediate contact of the vagina with the rectum and bladder prevents this kind of tumour from presenting exactly at the middle of the upper or lower surface of the canal, and occasions it to assume generally a lateral position.

The situation, in which the protrusion begins, is the same as in the perineal rupture; but the difference between the two cases is, that the vagina, which resists in the latter, yields in the former instance. Hence we should expect, what we find by expe-

rience to be true; *viz.* that women who have had children are the most subject to this complaint. The distention of the vagina and surrounding parts in such persons must weaken the powers of resistance. It may occur, however, in females who have never borne children*. The small intestine seems to be the part most frequently protruded: the urinary bladder sometimes descends, and the tumour then is on the anterior or upper surface of the vagina. The causes of the complaint do not differ from those of other ruptures: it has generally been formed in consequence of bodily exertion, as in raising a great weight, straining at stool, &c. HOIN† mentions the case of a young girl, subject to constipation, who was obliged to use violent exertion in expelling the feces; a vaginal rupture occurred from an effort of this kind.

The swelling is soft and equable, increasing by standing, and diminishing, or entirely disappearing, when the patient lies down. It becomes more tense when the patient holds her breath, and an impulse is felt in it on coughing. The contents may be readily pushed up by the hand; but they descend again if the patient coughs or strains. An increase

* RICHTER, p. 268; COOPER, pt. ii, pp. 65 and 66.

† In his “*Essai sur les Hernies rares, et peu connues*,” published in LEBLANC’S *Nouvelle Methode d’operer les Hernies*; 8vo. Paris, 1768. This work, which I have not seen, is quoted by RICHTER. The author mentions another instance, in which the complaint occurred on the seventh day after parturition, from lifting a pitcher of water.

of the swelling, with a very painful sense of bearing down, and of something giving way, precludes all laborious exertions, when no means have been employed to remedy the complaint. Disorders of the alimentary canal are often present. Frequently the bladder is affected, from the immediate vicinity of the tumour; and the symptoms connected with the urinary evacuation will be more marked where this bag itself is protruded. In such a case, pressure on the swelling occasions a discharge of urine through the meatus urinarius. The nature of the case is sufficiently pointed out by the characters already enumerated; but the possibility of a mistake is still further precluded by the power of feeling the os uteri in its natural state and situation behind the swelling.

The treatment of the case will consist in returning the parts by the pressure of the hand; and here the surgeon must remember, that the passage, by which the contents of the swelling descend, is of considerable length, consequently, that a portion of intestine may be contained in it, although the obvious tumour be reduced. Hence we should press on the surface of the vagina as far as the os uteri, so as to remove whatever might be contained in the neck of the sac. When complete reduction has thus been accomplished, future protrusion must be prevented by the use of a pessary. Since this object cannot be obtained without distending the sides of the vagina, pessaries of the common form are not sufficient. The globe-shaped instrument has been found to

answer; but the hollow cylinder is the most suitable.

If any difficulty should be experienced in the reduction, the recumbent position and the use of clysters would probably be sufficient to overcome it. But the most serious inconvenience would arise from the rupture protruding during parturition; and this consideration should lead us to adopt every measure which can obviate such an occurrence. Pressure should be made on the opening during the pains, until the head has descended into the pelvis; or, if the tumour is down, it should be pushed back into the abdomen, by introducing the hand into the vagina*; but if the head has descended, perhaps it would be best to accelerate the delivery as much as possible.

SANDIFORT† had an opportunity of examining a vaginal enterocele after death. A large oval tumour, in an old woman, proceeded from the back of the vagina, and protruded at the orifice of that canal. Its contents could be pushed back into the abdomen, but speedily returned. He found in it a very large portion of the small intestine, which entered by a round hole between the vagina and rectum. The cavity was lined throughout by peritoneum.

* SMELLIE'S *Cases*, p. 148.

† *Oservat. Anatomico-Patholog.* lib. i, cap. iv. “De hernia intestino-vaginali, aliisque hujus morbi speciebus.”

The following case, related by GARENGEOT*, is considered to have been the first distinct notice of the vaginal rupture. A woman, who had borne five children, felt an acute pain in the vagina, in consequence of lifting a burthen. At the same time a swelling took place in the part. This gradually increased, until it passed the os externum. The patient felt occasional colicky pains, with dragging at the stomach, and difficulty in voiding the urine. GARENGEOT felt the os uteri in its natural situation behind the tumour, and found the latter diminished by one-half, in consequence of his examination. On making the patient lie down, he easily pushed back all the contents of the swelling, when the upper and right portion of the vagina felt lax and thin. He now made her rise, walk about, and cough, which brought down the tumour again. After replacing it, he introduced an oval pessary, which succeeded for the first day; but, on the second, pain and vomiting came on, in consequence of the intestine being compressed between the instrument and the pubes. A hollow cylindrical pessary was then substituted, and kept up the parts completely. ARNAUD had employed the same means in a similar case.

A surgeon, having been called to a woman in labour, found the entrance of the vagina occupied

* *Mem. sur plusieurs Hernies singulières*, in the *Acad. de Chir.* tom. i, p. 707, et suiv.

by a large tumour, proceeding from its upper and anterior portion. The introduction of the catheter did no good, until pressure was employed at the same time; the urine then flowed off, the swelling was removed, and delivery was speedily and successfully completed*.

A large protrusion of the bladder into the vagina is recorded by SANDIFORT†. Retention of urine, and difficulty of introducing the catheter, followed a violent cough. A large tumour occupied the whole cavity of the vagina. Fluctuation could be felt in this, but no urine was evacuated on pressure, unless the catheter was introduced at the same time; then a plentiful evacuation ensued, but the contents were not entirely discharged, unless the compression was continued. When all the urine had been drawn off, the catheter could be easily introduced; the tumour disappeared; the superior part of the vagina felt lax and flaccid; and the finger could be pushed up to the mouth of the uterus, till the swelling began again to increase by the urine collecting in the bladder. The use of a pessary produced a

* VERDIER *Mem. sur la Hernie de la Vessie*; in *Mem. de l'Acad. de Chir.* tom. ii, obs. xviii, p. 33. See also the observations of Mr. CHRISTIAN on the retardation of delivery by fulness and prominence of the bladder towards the vagina, in the *Edinb. Med. and Surg. Journal*, vol. ix, p. 285. I doubt, however, whether hernia of the bladder existed in the cases to which he alludes.

† *Obs. Anat. Pathol.* l. i, cap. iii. De hernia vesicæ vaginali.

perfect cure. Three other cases of large swellings in the vagina, reduced by the employment of the catheter, and again increasing, were communicated to SANDIFORT by a very skilful physician, who practised midwifery.

Mons. CHAUSSIER found a vaginal cystocele, as large as the crown of a hat, in a patient who had made a great effort seven days after her delivery. A considerable tumour followed the exertion immediately, and increased, with complete retention of urine, for three days, when Mr. C. saw her. He succeeded in replacing it by gentle pressure: more than three pints of urine were slowly discharged, and the patient recovered without any permanent ill consequence*.

Sir A. COOPER † mentions two cases, in which the urinary bladder was protruded at the upper and front part of the vagina. Pressure on the swelling occasioned a discharge of urine, and left the part loose and flaccid. The swelling came on again, as the urine collected. RICHTER ‡ saw two instances in which the tumour was not larger than a nut.

When the uterus falls down to such an extent, as to invert the vagina, the connected bladder is dragged out of its place. This displacement, which is simply consequent on that of the uterus and vagina, constitutes quite a different case from the

* HOIN, *sur les Hernies rares*; BOYER, *Traité des Mal. Chirurg.* tom. viii, p. 376.

† Pt. ii, p. 66.

‡ P. 270.

hernia of the bladder in the vagina, occurring as a distinct and primary affection. In instances of the former kind, of very long standing, stones have been formed in the displaced portion of the bladder, and successfully removed by incision of the tumour*.

Several other cases of vaginal hernia are recorded †.

Pudendal Hernia.

IN the second part of his work, Sir A. COOPER has described, under this name, a peculiar case, very much resembling the vaginal hernia. The parts descend along the surface of the vagina; but, instead of protruding the side of that canal, pass between it and the levator ani, and form a tumour in the middle of the labium pudendi. Such a case resembles the vaginal rupture in its origin, and the perineal in the circumstance of being protruded at

* RUYSCH, *Obs. Anat. Chir.* Amst. 1691; Obs. i, tab. i, and in *Thesaur. Anat.* octav. p. 57, tab. iii, fig. iii; TOLET *de la Lithotomie*; Paris, 1708, chap. xxv, p. 176; DUVERNEY in *Mem. de l'Acad. de Chir.* tom. ii, p. 28.

† GUNZ *de herniis*, p. 83, et seq.; DE HAEN *Rat. Medend.* pt. i, cap. vii, p. 87; HOIN *Essais sur différentes Hernies*; Paris, 1768; or in LEBLANC, *Précis d'Operations de Chirurgie*; p. 459; LEVRET, *des polypes*, p. 154; J. C. STARK *de hernia vaginali*, &c. Jenæ, 1796, 8vo.; STEIN, *Nachgelassene geburtshülffliche Wahrnehmungen*, 1 Th. 1807, No. 22, 23, and 92; CAMPER *Diss. de optima agendi vel expectandi in medicina ratione*, 1776.

the edge, or between the fibres of the levator ani. The situation of the swelling may cause it to be mistaken for bubonocoele; but the distinction arises from the upper part of the labium being completely free in this case; whereas the swelling of an inguinal hernia extends into the ring. The characters of the tumour possess no peculiarity. Its continuation along the side of the vagina may be felt by introducing the finger into that canal. It should be treated in the same manner as a vaginal hernia. The following case is related in Sir A. COOPER's work.

A young woman, aged twenty-two, laboured under the symptoms of a strangulated hernia. A swelling, equal in size to a pigeon's egg, occupied the left labium: it had frequently descended during the last six months, but the patient could reduce it herself with little effort and pain. The tumour was placed below the middle of the labium: the upper part of which, and the abdominal ring, were perfectly free from tumefaction: it could be traced along the side of the vagina, nearly as high as the os uteri. An impulse was felt on coughing. "I then," says the author, "grasped the swelling, and pressing on it with some little force, which gave her a great deal of pain, in about three minutes it went up with a guggling noise, and she became easy. The labium then felt flaccid, as if a tumour had been taken from it, and when the finger was placed in this flaccid and hollow portion of skin, it could be

forced back into a circular orifice on the inner side of the branch of the ischium, and between it and the vagina. The only method she has since used to keep the hernia up is to wear a common female bandage between the thighs, and fixed around the abdomen."

Mr. A. BURNS found the bladder protruded so as to form a pudendal hernia in the body of an old woman. The anterior lateral portion of the viscus, on each side, passing between the levator ani and obturator internus, then descended along the side of the vagina, and reached the labium pudendi, near the perineum *.

Mr. J. CLOQUET† saw a pudendal hernia in an unmarried female, twenty-four years old. There was a swelling, equal to a large chesnut, in the right labium, and a prominence, about two inches long, extending from it along the side of the vagina. It was easily reduced, and the patient suffered no return of the complaint, although she employed neither bandage nor pessary. When the parts had been pushed up, a vacuity was perceptible in the labium; and the end of the finger could be pushed into the circular aperture, through which they had descended.

SCARPA‡ mentions two cases of pudendal hernia, which had been treated by him. One was an

* MONRO, *Morbid Anatomy of the Gullet, &c.* p. 523.

† *Observation sur une hernie vulvaire*; Paris, 1821.

‡ *Supplément*, pp. 140 et 142.

enterocele in an unmarried woman of forty-five; the other a cystocele in a lady who had had one child. The orifice of the sac could be felt in both, by pressing the integuments of the labium inwards with the finger, after the protrusion had been reduced.

Another case of pudendal cystocele is quoted by the French translator of SCARPA* from the *Revue Medicale*, December, 1822.

* *Supplément*, p. 145.

CHAPTER XXIII.

RUPTURE AT THE FORAMEN OVALE OF THE PELVIS.

A CONSIDERABLE oblique notch is observed on the under surface of the horizontal branch of the pubes ; and a deficiency exists under this part in the obturator ligament, so as to leave a sufficient space for the passage of the obturator blood vessels and nerve. This foramen is larger than would suffice for transmitting the parts : it is formed above by the notch of the pubes, at the sides and below by the margin of the ligament. Protrusions of the abdominal contents have taken place through it, and have been described under the names of obturator or thyroideal hernia.

It seems that the elder ARNAUD* had first noticed this peculiar kind of rupture ; and DUVERNEY† afterwards met with it in the dead subject. His observation was communicated to the Royal Academy of Sciences, but is not printed in their memoirs. On both sides of the pelvis of a female, the peritoneum had been protruded through the openings, at which the obturator vessels pass, so as to

* *Mem. de l'Acad. de Chir.* tom. i, p. 711.

† *Ibid.* p. 714.

form swellings, each of which was about the size of an egg. These contained intestine, were placed between the anterior heads of the triceps, and formed an external tumour. GARENGEOT had become acquainted with the facts noticed by ARNAUD and DUVERNEY; and has related some other cases in his *Memoire sur plusieurs Hernies singulières**, the first publication in which the existence of the obturator hernia was clearly proved. Besides the case of DUVERNEY, this memoir contains a similar fact noticed by Mr. HOMMEL, of the Anatomical Theatre at Strasburg. He observed the peritoneum protruded through the obturator holes, and forming swellings equal to pigeons' eggs; and showed the parts to GARENGEOT†. Subsequent experience has so amply confirmed the fact, that no doubt can remain on the subject.

HEUERMANN‡ found a piece of ileum, equal in length to a finger and a half, protruded at the right foramen ovale of a woman; and preserved the parts. The sac was covered by the first and second heads of the triceps and the pectineus, had acquired the size of a hen's egg, and had caused neither pain nor swelling during life. An entero-epiplocele has been seen in the same situation in a young man, seventeen years of age§. CAMPER|| and Sir A. Co-

* Ibid. pp. 709—716.

† Ibid. p. 716.

‡ *Chirurgische Operationen*; Copenh. b. i, § 262, p. 758.

§ KLINKOSCH, *Dissertation. med. Pragens.* vol. i, p. 185; quoted in RICHTER, p. 296.

|| “Memini me in cadavere macilenti senis peritonæi dilata-

PER* have seen small protrusions of the peritoneum at the passage of the obturator vessels in the dead subject; and an opportunity once occurred to myself of observing a similar fact. There was a small pouch, capable of holding the last joint of the little finger, on each side of a female subject. In this, as well as in Sir A. COOPER's case, the blood vessels were behind the sac.

A case is minutely described by Mr. CLOQUET †, in which a thyroideal entero-epiplocele caused death. It produced no visible external swelling. The tumour was about the size of a small hen's egg, and contained sphacelated intestine and omentum. It was covered by the pectineus and adductor longus, and rested on the vessels and nerve. The parts were deposited in the collection of the Medical Society at Paris. The same intelligent observer states, that these ruptures are more common than has been

tiones, profunde juxta obturantia vasa sinum ingredientes in utroque latere vidisse." CAMPER in *Demonstrat. anatomico-patholog.* lib. ii, p. 17.

VOGEL met with a similar appearance. *Von den Brüchen.*

The nature of the case mentioned by RAYATON (*Traité des plaies d'armes á feu*, p. 306) is doubtful. If it were an obturator hernia, it is an example of fatal incarceration.

Notices of other cases, more or less authentic, may be seen in GUNZ *de herniis*, p. 79 et seq. p. 96; and in LENTIN *Beyträge zur ausübenden arzneywissenschaft*, 1804, p. 42.

* Pt. ii, p. 70, and pl. xi, fig. ii. The protrusion was very small, and on the right side of a male subject.

† *Journal de CORVISART*, tom. xxv; *Bulletin de la faculté de Médecine*, p. 194.

generally supposed, and that they are more frequent in the female than in the male sex*.

In the cases now enumerated, the complaint was not discovered until after death ; and, when we consider how the tumour is surrounded by the muscles of the thigh, we shall not be surprised at finding that it has caused no external swelling, nor ever exceeded a small size. The pectineus, the long and middle heads of the triceps, and the gracilis, completely inclose the space into which the sac protrudes, and must, by their pressure, prevent it from increasing to any great bulk. These circumstances of anatomical position would undoubtedly lead us to suppose that the complaint could never be recognized during life. Yet we are informed by GARENGEOT, that ARNAUD has reduced several obturator herniæ, and kept them up by bandages ; that he himself had seen and reduced two such ruptures in the living subject ; and that two other instances had been communicated to the Academy. The careful perusal of these facts has not satisfied me that they were obturator herniæ†.

* *Recherches Anat.* p. 87.

† I cannot think that the two cases mentioned by ESCHENBACH were, as he represents them, ruptures through the foramen ovale. *Observata anatomico-medico-chirurgica rariora*, 1769, p. 265, et seq.

CHAPTER XXIV.

ISCHIATIC RUPTURE.

A FEW cases are recorded, in which ruptures have occurred at the great sacro-sciatic foramen of the pelvis. Since the sac is covered at this point by the glutens maximus, it could not be perceptible externally, until it had acquired a considerable size; and the resistance of the muscle would probably oppose its increase. Hence we do not find that it has ever been recognized in the living subject*.

* An exception must be made to this remark, if we admit, according to the general opinion, that the case, described in PAPEN'S *Epistola de stupenda Hernia dorsali*, was an ischiatic rupture. A woman at the age of forty, perceived near the right side of the anus a small tumour, which gradually increased into an immense pendulous bag, hanging down to the knee. She was obliged to lie on the left side, to suspend the tumour from the back, when at work, and to elevate and compress it in order to promote the evacuation of the feces. Frequent borborygmi were heard in the part. It seems that this great infirmity did not materially affect the patient's health, nor prevent her from following laborious occupations, as she died suddenly while employed at harvest work, and her body was very fat. The swelling resembled an oblong flask, narrowest towards the anus, and increasing below. Its length was an ell, and the circumference of the lower part half an ell. It formed a cavity lined by peritoneum, and containing all the small intestine, with part of the large, and of the omentum. The course of the stomach described a perpendicular line,

BERTRANDI* had seen the ileum protruded on the right side in two instances; and BOSE† mentions, that the small intestine was protruded in a case, which came under his observation. CAMPER‡ met with an example on the left side of the female pelvis. The opening of the bag was narrow, and the fundus considerably larger: it contained the ovarium, which was larger than usual. The finger introduced into the sac could be felt distinctly on

and the pylorus was at the entrance of the sac in the pelvis. The opening, at which the parts protruded, is by no means clearly described. The circumstance of the swelling having been perceptible when small, of its situation near the anus, and of its increase to so great a bulk, make me doubt whether the parts had passed out at the sacro-sciatic foramen. HALLER *Disput. Chirurg.* tom. iii.

The preceding case and an analogous instance recorded by BOSE (*Programma de Enterocoele ischiadica*; Lipsiæ, 1772), are regarded by SCARPA as examples of pudendal hernia. *Supplément*, p. 149.

I am equally doubtful respecting the instance cursorily mentioned by LASSUS, and considered by him to be an ischiatic hernia. The tumour was of the size of a fist; had not been attended with any troublesome symptoms; and was cured by trusses and lying in bed two months. *Pathologie Chirurgicale*, tom. ii, p. 103.

The following case is mentioned so shortly, that it also must be classed among the doubtful instances. “My father had occasion to visit a child with a large tumour under the glutei muscles, which became tense when the child cried, owing to the tumour containing a large portion of intestine.” MONRO, *Morbid Anat. of the Human Gullet*, &c., p. 380.

* *Mem. de l'Acad. de Chir.* tom. ii, p. 2, note a.

† *Programma de enterocoele ischiadica*; Lips. 1772.

‡ *Demonst. anat. pathol.* lib. ii. p. 17.

the outside, notwithstanding the thick external coverings. A case, in which a fatal strangulation of the small intestine took place in the same situation, is recorded in Sir A. COOPER's * work. The swelling was small, and its existence not suspected during the patient's life.

* Pt. ii, p. 73 ; plates xii, xiii.

CHAPTER XXV.

HERNIA OF THE DIAPHRAGM.

A MALFORMATION of the diaphragm, consisting of a preternatural fissure, forming a communication between the thoracic and abdominal cavities, has, in many instances, allowed the viscera of the abdomen to pass into the thorax. Such an occurrence will interfere with respiration in proportion to the magnitude of the protrusion, and will disturb, more or less seriously, the intestinal functions, at the same time that it exposes the patient to the risk of a fatal strangulation.

These ruptures are much more frequent on the left than the right side; a difference which the situation of the liver, and its close apposition to the right concavity of the muscle, readily account for. Where, however, the deficiency of the diaphragm is very considerable, the whole liver has been found, in a newly-born child, in the right cavity of the chest*: and a smaller slit, giving passage to a less considerable protrusion, has been seen on the right side of the diaphragm in the adult†.

* MACAULAY in *Medical Observations and Inquiries*, vol. i, art. iv, case ii; VICQ D'AZYR in *Memoires de l'Acad. des Sciences*, 1772, pt. ii, page 81.

† BONN, *Descriptio thesauri ossium morbosorum Hoviani*;

The muscular portion is the usual seat of the fissure; it has been seen less frequently in the tendinous fibres; and protrusions have occurred still more rarely at the opening which transmits the œsophagus*.

In many cases, the diaphragmatic hernia is congenital: a large portion of the abdominal viscera is found in the chest at the time of birth, and the child dies soon after†.

No. cciv, p. 69. The opening was near the gall-bladder; and the protruded parts consisted of colon, with nearly the whole omentum. BOWLES in *Medical Records and Researches of a private Medical Association*, p. 14. The protrusion was on the right side of the ensiform cartilage.

* FANTONI *de Observat. med. et anat. Epist.* 1714, Epist. 23. The stomach and a part of the omentum had passed into the chest. See also *Ephem. nat. cur.* cent. iii and iv; App. p. 147. St. ANDRÉ mentions that he found the parts strangulated in a fatal case near the passage of the great sympathetic nerve. The description, however, does not enable us to form a clear opinion of the real nature of the case. *Philos. Transact.* vol. xxx, No. cccli.

† HOLT in *Philos. Transact.* vol. xxii, No. cclxxvii, p. 992. The child lived two months; STAEBELIN in HALLER, *Diss. Anat.* vol. iii, No. iii; MACAULAY, *Loc. cit.*; KLEIN *Diss. sistens monstrorum quorundam descriptionem*; Stutgard, 1794, Case iv; VETTER *aphorismen aus der praktischen anatomie*, p. 144; COOPER *on Crural and Umbilical Hernia*, p. 76; SOEEMMERRING *Ueber die Ursache, Erkenntniss und Behandlung der Brüche am Bauche und Becken*, p. 12; HALLER, *Elem. Physiol.* tom. vi, p. 118; VAN GEUNS in *Transactions of the Dutch Society*, &c. tom. viii, pt. i, p. 171; SANDIFORT *Obs. Anat. Patholog.* lib. iv, cap. v, p. 48, note p; FOTHERGILL in *Philos. Trans.* vol. xlv, No. cccclxxviii; or in his *Works*,

Sometimes the parts pass occasionally into the preternatural opening, causing indigestion, nausea, colicky pains, anxiety, difficulty of breathing, &c. and return again: the person ultimately dies of strangulation*. Violent vomiting, coughing, or other efforts will cause protrusion, as in ordinary cases of hernia. A rupture of the diaphragm † from fractured ribs, or other accidents, may allow the abdominal viscera to pass into the chest.

vol. i. This child lived ten months ; and its symptoms are minutely detailed. VICQ D'AZYR, loc. cit.

* RIVERIUS, *Obs. Med.* cent. iv, obs. lxxvii. The case of a youth twenty-four years old, who had experienced no inconvenience during his life. Protrusion was caused by an emetic. MORGAGNI *de caus. & sed. morbor.* Epist. liv, art. xii and xiii; LIEUTAUD, *Histor. Anatomico-Med.* tom. i, obs. cccxii, &c.; LODER, *Programma, obs. herniæ diaphragmatis*, Jenæ, 1784; HALLER, VAN GEUNS, SANDIFORT, VETTER, *locis citatis*; BARTHOLIN *Histor. Anat. Var.* cent. vi, hist. lv; JAGWITZ in *Act. Berolinens.* Dec. ii, vol. iv, obs. i.; PETIT, *Traité des Malad. Chirurg.* 2d edit. p. 229, et suiv.; CLARKE, in *Transactions of a Society for the improvement of Medical and Chirurgical Knowledge*, vol. ii, art. viii; BAILLIE'S *Engravings*, fascic. iv, pl. viii, fig. i.; CHAUVET in *Mem. de l'Acad. des Sciences*, 1729, p. 11.; MONRO on *Crural Hernia*, p. 10.

† AMBR. PARÆI, *Opp.* 1594, lib. ix, cap. xxx, p. 308; FAB. HILDANUS, cent. ii, obs. xxxiii; MUYS, *Prax. Med. Chir.* dec. v, obs. ii; KIRSCHBAUM *Diss. de hernia ventriculi* in HALLER *Diss. Chir.* tom. iii, p. 218; PLENK, *Sammlung von Beobachtungen*, I. theil. : DERRECAGAIX in DESAULT *Journal de Chirurgie*, tom. iii, art. ii; COOPER on *Crural and Umbilical Hernia*; p. 80; MONTEGGIA, *fasciculi pathologici*, Mediolan. 1789, p. 99.; WHEELWRIGHT in the *Medico-Chirurgical Transactions*, vol. vi, p. 374.

The stomach, colon, omentum, spleen, and left lobe of the liver, are the parts most frequently protruded; the small intestine, and the whole liver, have also been found in the chest. The viscera lie in the cavity in contact with the lungs, and the edges of the opening which transmits them are smooth, the peritoneum and pleura being united at the fissure. One or two instances, however, have been seen, in which the protruded parts were contained in a membranous sac, formed by the two serous membranes just mentioned*. In such a case, there cannot, of course, have been any fissure naturally existing in the diaphragm: the parts must have been urged between the fasciculi of that muscle, where they were weaker, or more loosely connected than usual. We can easily understand how the peritoneum would yield to the pressure of the viscera, so as to form a sac for them, as it does in other herniæ; and it is also clear, that this peritoneal sac must be covered towards the chest by the pleura. Both these membranes, however, are too

* BOWLES in *Medical Records and Researches*, p. 15; PETIT, lib. cit. p. 233: he says that the protruded parts (stomach, colon, and omentum) were contained in a sac, formed of a "prolongation du péritoine, du diaphragme et de la plevre ensemble, sans aucune rupture dans les membranes, ni aucun écartement dans les fibres musculieuses et tendineuses du diaphragme." BECLARD in *Supplément au traité de SCARPA*, p. 132; a case of two diaphragmatic epiploceles, in which the sacs were formed by the pleura and peritoneum inseparably united. The parts are represented in pl. xx and xxi.

firmly connected to the diaphragm to admit of their yielding to any great extent.

As the symptoms do not point out the existence of diaphragmatic hernia during life, and as we could not relieve the patient even if they did, there is nothing to be said on the subject of treatment.

CHAPTER XXVI.

STRANGULATION OF THE BOWELS WITHIN THE CAVITY OF THE ABDOMEN.

THE cases considered in this chapter do not fall properly under the description of ruptures; as the viscera are not protruded from the abdomen, but incarcerated within the cavity: nor is the subject of much practical importance, since there is no external tumour, no possibility of discovering the cause of the complaint before death, nor of affording any relief.

Suppression of stools is the first symptom; inordinate distention and inflammation of the alimentary canal above the stricture, follow sooner or later. This inflammatory disorder extends over the whole cavity, and destroys the patient, insuperable constipation continuing throughout the complaint. The appearances on dissection are the same with those observed in patients who die with strangulated ruptures; see p. 54.

Membranous cords forming adhesions very frequently cause incarceration. They may be attached to any part of the cavity, or of its contents. The appendix vermiformis, the Fallopian tube, and diverticula of the small intestine, when fixed at their

loose extremities to some neighbouring part by such adhesions may cause death in this way *. I have seen several examples of such occurrences. Sacs are sometimes formed in those processes of peritoneum, which consist of two layers; as the mesentery, mesocolon, the process belonging to the sigmoid flexure of the colon, and the ligamentum latum uteri †. Of the two latter I have myself seen instances.

* *Giornale di Medicina*, tom. i, p. 91; AMYAND, *Philos. Trans. abridged*, vol. ix, p. 124. *Journal de Medecine*, tom. xxxii; GARTHSHORE, in *Med. Obs. and Inquiries*, vol. iv, p. 223; MOSCATI, in *Mem de l'Acad. de Chir.* tom. iii, p. 468; LA PEYRONIE, *ibid.* tom. i, p. 337; KLOECKHOFF, in *Haarlemische Abhandlungen*, vol. xii, No. viii; BORDENAVE, *Hist. de l'Acad. des Sciences*, 1779, p. 8; MEYER, *de strangulationibus intestinorum in cavo abdominis*, Argent. 1776; HEY'S *Practical Observations*, p. 232; VAN DOEVEREN, *Specimen Observ. Acad.* c. v; MONRO *on Crural Hernia*, p. 13; COOPER *on Crural Hernia*, p. 85 et seq.

† DE HAEN, *Rat. Medendi*, pt. xi, cap. iii, § ii; KNOBLOCH, *Diss. de Entero-Mesocolocele*, Lugd. Bat. 1767; MONRO *on Crural Hernia*, p. 12; COOPER, *lib. cit.* p. 82 et seq.; CALLISEN, in *Act. Soc. Med. Hafniens*, vol. ii; DE WITT, in *Abhandlungen der Gessellschaft zu Vlissingen*, 1r. theil.

THE END.

LONDON:

PRINTED BY CHARLES WOOD,
Poppin's Court, Fleet Street.

